Final Report

ENERGY EFFICIENCY STUDY STEAM, WATER, AND SEWER SYSTEMS

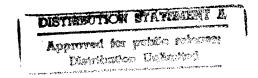
FORT GREELY, ALASKA

Prepared for

U.S. ARMY ENGINEER DISTRICT, ALASKA ANCHORAGE, ALASKA

Under

U.S. ARMY ENGINEER DISTRICT, MOBILE INDEFINITE DELIVERY A-E CONTRACT Contract No. DACA01-94-D-0033 Delivery Order 003 EMC No. 1406-003



March 1996

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By

E M C Engineers, Inc. 2750 S. Wadsworth, Suite C-200 Denver, Colorado 80227 303/988-2951

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DEPARTMENT OF THE ARMY

CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS P.O. BOX 9005 CHAMPAIGN, ILLINOIS 61826-9005

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LIST OF ABBREVIATIONS

ACH - air changes per hour

AHU - air handling unit

ASHRAE - American Society of Heating, Refrigeration, and Air-Conditioning

Engineers

Btu - British thermal units

Btuh - Btu per hour

ccf - one hundred cubic feet

cfm - cubic feet per minute

DPW - Department of Public Works

ECIP - Energy Conservation Investment Program

ECO - Energy Conservation Opportunity

EMC - E M C Engineers, Inc.

F - Fahrenheit

FEMP - Federal Energy Management Program

FLA - full load amperes

ft - foot, feet

ft² - square feet

gpm - gallons per minute

hp - horsepower

hr - hour

HRU - heat recovery unit

HVAC - heating, ventilating, and air-conditioning

KBtu - one thousand British thermal units

Klb - one thousand pounds

kW - kilowatt, one thousand watts

kWh - kilowatt-hours, one thousand watt-hours

LCCA - Life Cycle Cost Analysis

MER - Mechanical Equipment Room

rpm - revolutions per minute

SF - square foot, feet

SIR - Savings-to-Investment Ratio

SOW - Scope of Work

SPV - single present value factor

SZ - single zone

temp. - temperature

U - thermal transmittance

UA - thermal transmittance x area

UPV - Uniform Present Value factor

yr - year(s)

EXECUTIVE SUMMARY

AUTHORITY FOR STUDY

This energy efficiency study of steam, potable water, and sanitary sewer systems was conducted and this report prepared under the Indefinite Delivery Architect-Engineer Contract for Energy Engineering Analysis Program (EEAP) No. DACA01-94-D-0033, Delivery Order No. 3.

PURPOSE OF STUDY

The purpose of the Energy Efficiency Study is to identify modifications necessary to provide the most energy efficient configuration of utilities (steam, water, and sewer) to serve designated active buildings at Fort Greely following implementation of the base realignment plan. Specifically the study is to evaluate central versus distributed utility systems.

UTILITY OPTIONS

The following utility options were analyzed:

- **Baseline**. The baseline reflects the current operating costs of the utilities at existing operational levels.
- Reduced Central Utilities with Abandoned Buildings Heated to 45°F. This option assumes continued operation of the central utilities to serve active buildings and to provide heat to utilidors and abandoned buildings to prevent deterioration.
- Reduced Central Utilities with Abandoned Buildings Not Heated. This option assumes continued operation of the central utilities to serve active buildings and to provide heat to utilidors to prevent freezing of water and sewer pipes.
- Reduced Central Utilities Serving Only Active Buildings and Selected Utilidors. This option assumes continued operation of the central utilities to serve active buildings and to provide heat to only those utilidors serving the active buildings. Steam, water, and sewer pipes in inactive utilidors would be isolated and drained. Fire hydrants served by inactive utilidors would not be operational.
- Distributed Utilities. This option would provide individual boilers, wells, and septic systems for each individual active building. All utilidors and existing fire

hydrants would be abandoned. Underground cisterns for fire protection would be provided in selected locations.

- **Mixed Utilities.** This option combined distributed heating and sewer systems with a central water system. Three options for freeze protection of the central water system were evaluated:
 - 1. **Circulation to Drain.** This option prevents freezing of the water distribution by constantly circulating water to each active building.
 - 2. **Heating and Circulation to Drain.** This option heats water circulating through the distribution system to 60°F and maintains water distribution temperatures above 32°F.
 - 3. **Heating, Circulation to Drain, and Pipe Insulation.** This option combines insulated water pipes with heating circulating water to 60°F and maintains water distribution temperatures above 32°F.

LIFE CYCLE COST ANALYSIS

Figure ES-1 below presents the results of the life cycle analysis.

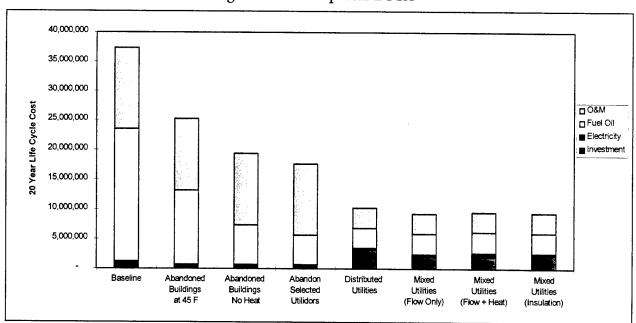


Figure ES-1. Graphical LCCA

The Mixed Utilities option with heating, circulation to drain, and pipe insulation for protecting the water distribution system is recommended. The mixed utilities option has

the least life cycle cost and requires the least capital investment of the utility options. The recommended freeze protection option is slightly more expensive than other freeze protection options, but it is considerably more reliable.

DISCUSSION

The study revealed the following about each utility:

• STEAM HEATING. The existing central steam heating plant serves over 100 building. The number of active buildings will be reduced to ten buildings. The existing central steam heating plant cannot efficiently serve only ten active buildings. Heat loss from the central steam distribution system exceeds the space heating load of the ten active buildings. Fuel oil consumption of distributed boilers would be about half that of operating the existing central steam heating plant.

A 16 man utility staff is currently required to operate the existing central utilities with most of the staff dedicated to operating the central steam heating plant. Distributed boilers do not require continuous manning and the existing utility staff could be cut to 4 people saving about \$760,000 per year.

 WASTE WATER. The existing central contonment area is served by a central sewer system and waste water treatment plant. The central sewer system is located in a utilidor system which must be continuously heated by heat loss from steam piping to prevent freezing of sewer pipes.

It is not possible to operate the central sewer system unless the central steam distribution system is operated also. The alternative is a dedicated septic system for each remaining active building which also saves the energy and manpower required to operate the waste water treatment plant.

POTABLE WATER. Buildings and fire hydrants in the existing central contonment
area are served by a central water system which receives water from wells. There is
a 180,000 gallon water storage tank on the system for fire protection. The water
distribution system is located in a utilidor system which must be continuously
heated by heat loss from steam piping to prevent freezing of water pipes.

Annual operating cost of the water system is small. The capital costs of providing dedicated water wells at each active building and fire protection cisterns is high. Therefore, the central water system should be retained.

A different method of freeze protection for the water distribution system will be required since the utilidors will no longer receive heat from the existing central steam heating system. A continuous circulation system is recommended which draws water from the wells, heats and circulates it through insulated water distribution piping to each active building, where it is recycled to the earth via the septic system.

PROJECT ECONOMICS

Operation of existing central utilities would require little capital investment, but would incur higher than necessary operating costs. The recommended mixed utility option would require a large capital investment, but would operate more efficiently. The ECIP economic evaluation form on the following page evaluates the economics of the recommended mixed utility option relative to the most cost effective central utility option.

The results of the ECIP evaluation are a 3.0 year simple economic payback and a Savingsto-Investment Ratio (SIR) of 4.7.

RECOMMENDATIONS

The mixed utilities option with potable water freeze protection by water heating, circulation to drain, and pipe insulation is recommended. The other mixed utility options offer similar favorable economics and could be implemented with similar simple economic paybacks and SIRs. The only difference in the three mixed utility options are the method of freeze protection for the central water system. The following modifications are required:

- The central steam plant would be abandoned.
- Each remaining active building should be fitted with a steam boiler and fuel oil tank. Existing HVAC and DHW heating equipment in each building should be connected to the new steam source.
- Each remaining active building should be fitted with a septic tank and drain field.
- The portion of the existing central water system serving active buildings should be retained. The existing well and storage tanks within the central steam plant should be retained. Freeze protection should be provided for the central water system in the form of water heating, circulation to drain, and pipe insulation. Water flow for freeze protection would be recycled to the ground through the proposed septic system.

It should be noted that fire hydrants near active buildings will still be functional, but fire hydrants in the vicinity of abandoned buildings will not.

The cost of the above modifications is estimated at \$2,227,641. Economic comparison of the recommended option to the most cost effective central plant option indicates a 3.0 year simple economic payback and a Savings-to-Investment Ratio (SIR) of 4.7.

Į.	COMPONENT MILITARY CONSTRUCTION PROJECT DATA ARMY					2. DATE Dec-95					
	ALLATION AND LOCAT	ION									Dec-33
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	PROJECT TITLE	Ĭ:	Replace C	entral Utilities with	n Distrib	outed Util	ities			FISCAL YEAR:	1995
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	ANALYSIS DATI	E :	03/25/96		1	ECONON	AIC LIFE	20		PREPARED BY:	D Jones
1. II	NVESTMENT										
A	CONSTRUCTIO	N COST	=	=						\$1,997,884	
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c	DESIGN COST			(6.0% of 1A) =						\$1 19,873	
D	. TOTAL COST			(1A +1B +1C) =						\$2,227,641	
E	SALVAGE VALU	E OF EXISTI	NG EQUIPM	IENT =							
F			REBATE =								
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1. INTRODUCTION

1.1 AUTHORITY FOR STUDY

This energy efficiency study of the steam, potable water, and sanitary sewer systems was conducted and this report prepared under Contract DACA01-94-D-0033, Delivery Order No. 003 issued by the U.S. Army Engineers District, Mobile, to E M C Engineers, Inc. of Denver, Colorado, on approximately 8 August 1995. The delivery order was temporarily suspended until approximately 14 August 1995 when the Scope of Work was modified to include the impact of the 1995 Base Realignment and Closure (BRAC). A separate energy efficiency study of the electrical distribution system was prepared under the same delivery order number. The delivery order was managed by the U.S. Army Engineers District, Alaska, in Anchorage.

1.2 PURPOSE OF STUDY

The purpose of the Energy Efficiency Study is to identify modifications necessary to provide the most energy efficient configuration of utilities (steam, water, and sewer) to serve designated active buildings at Fort Greely following implementation of the base realignment plan. Specifically the study is to evaluate central versus distributed utility systems.

1.3 SCOPE OF WORK

The Scope of Work (SOW) for this study is defined in the contract title "Scope of Work, Energy Efficiency Study for Fort Greely, Alaska" performed as part of the Energy Engineering Analysis Program (EEAP), dated August 1995. In particular, the "General Scope of Work", pages 1 to 6 and "Annex D, Detailed Scope of Work (Revised)", pages D-1 to D-5 are relevant to the steam, water, and sanitary sewer systems. A copy of the SOW is contained in Appendix A.

The SOW requires the study to evaluate the following configurations for each utility:

- Modification of central systems to serve remaining designated active buildings.
- Installation of separate (distributed) utilities to serve each designated active building or group of buildings.

The permanent active facility list is constantly changing. EMC was furnished the following Permanent Active Facility List in Table 1-1 below on which to base the study. The buildings currently served by the existing central utilities are indicated on the table. The

active buildings currently not served by central utilities are already equipped with distributed utility systems and were not evaluated by this study.

Table 1-1. Permanent Active Facility List

Bldg. No.	Description	Location	Size (SF)
110	POL Monitoring	North Post	382
501	HQ	Cantonment	19,095
503	Gym with Pool	Cantonment	27,430
504	Fire Station	Cantonment	6,192
605	Consolidated PW	Cantonment	24,915
606	Central Steam Plant	Cantonment	30,334
607	Steam Plant Annex	Cantonment	999
612	Tank Maintenance	Cantonment	18,681
615	Roads and Grounds	Cantonment	17,351
617	POL Operation	North Fort	448
618	POL Operation	North Fort	621
625	Pump House	Cantonment	293
633	Sewage Treatment	Cantonment	2,784
638	Sewage Lagoon	Cantonment	742
639	Contact Chamber	Cantonment	696
658	Temp Motor Pool	Cantonment	25,425
<i>7</i> 25	School	Cantonment	54,604
820	Housing	Cantonment	16,175
821	Housing	Cantonment	16,175
1419	Range	Mississippi Range	960
1928, 1930	CRTA Complex	Bollo Labs	35,061
1343, 1350, 1352	Range	Beales Range	4,968
1600, 1605, 1606	Range	Test Ranges	6,211
2013, 2019, 2025	NWTC Complex	Black Rapids	39,218
		Total	349,760

Shaded buildings are served by central utilities.

1.4 APPROACH

A detailed field survey was completed the last week of August 1995. The following options were evaluated:

 Baseline. A baseline economic model for operation of the central steam, water, and sewage systems was developed which reflects the current operating costs of the utilities. The economic model includes electrical and fossil energy costs and operations and maintenance costs.

- Reduced Central Utilities. The baseline economic model was then modified to reflect the reduced mission of the Fort assuming central utility systems would be retained. The inactive buildings were assumed to be taken off the utilities.
- Distributed Utilities. Cost savings and implementation costs for distributed utilities were evaluated. Distributed utilities would provide individual utilities for each active building in the form of individual boilers, wells, and septic systems.
- Mixed Utilities. A combination of central and distributed utilities was evaluated.

The options were then compared using life cycle cost analysis and recommendations made.

1.5 ORGANIZATION OF REPORT

This report is organized as follows:

- Section 2 examines the existing baseline utilities.
- Section 3 examines the existing central utilities operating at reduced capacity.
- Section 4 evaluates distributed utilities.
- Section 5 evaluates combined distributed and central utilities.
- Section 6 presents the life cycle cost analysis.
- Section 7 summarizes the results of the analysis and makes recommendations.

2. BASELINE UTILITY SYSTEMS

The existing utility systems were investigated to establish models for the operating costs of existing utilities and to verify these baseline models with historical data. Once these baseline models were established, they were modified to reflect the reduced mission of Fort Greely.

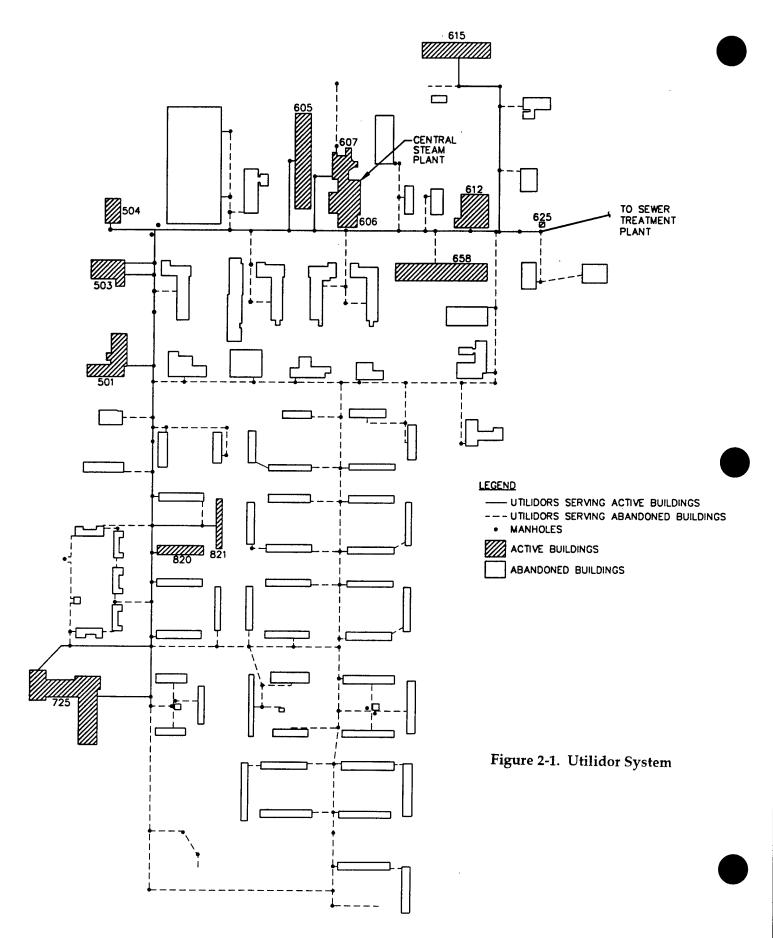
2.1 CENTRAL STEAM HEATING SYSTEM

2.1.1 Description

The central steam plant contains three boilers which were installed in 1954. Two of these boilers were replaced in 1993, and one original boiler remains in service. All boilers have been very well maintained and are in excellent condition. The steam distribution piping, which is accessible in the utilidors, has also been very well maintained. The field survey team commented that Fort Greely has the cleanest, best maintained central steam plant they have seen at a military base.

The three existing central steam heating system boilers are each rated at 50,000 pounds per hour (LBH) of 120 psig steam. The boilers have a maximum working pressure of 160 psig and produce no superheat. Boiler fuel is No. 2 arctic diesel oil with a higher heating value of about 134,500 Btu per gallon. Each boiler is equipped with both forced and induced draft fans equipped with 25 horsepower electric motors. The exception is Boiler 3, which has a 40 horsepower induced draft fan.

Steam is distributed at 120 psig to the buildings in the central cantonment area through steam piping running through underground utilidors. Utilidors are concrete passageways buried about 6 feet underground through which steam, potable water, and sewer pipes are routed. Figure 2-1 on the following page is a diagram of the utilidor system at Fort Greely. Heat loss from the steam pipes provide sufficient heat to prevent freezing of the water and sewer pipes.



2.1.2 Performance

The existing central steam heating system efficiency analysis was based on a previous energy study completed in 1977. The following efficiency curve for Boilers 1, 2, and 3 resulted.

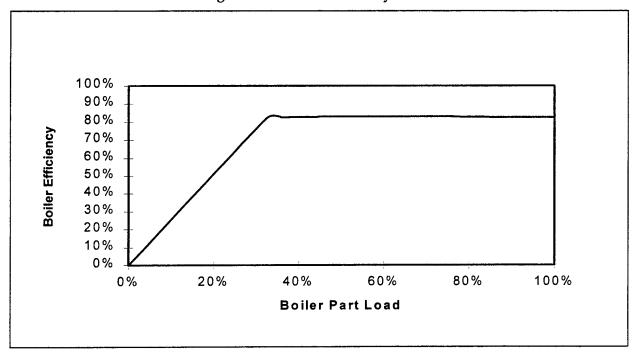


Figure 2-2. Boiler Efficiency Curve

Boiler efficiency is about 83% between 30% and 100% of the boiler part load. The boiler efficiency drops off rapidly below 30% part load. The portion of the curve at a part load less than 30% was extrapolated. This curve is typical of boilers of this type. Taking all three boilers into consideration, efficient operation is possible in the 10% to 100% plant capacity range.

2.1.3 Energy Consumption

The central steam distribution system currently serves 101 buildings with a total floor area of 1,256,172 square feet. Total annual steam use was calculated as follows:

 Space Heating is the major consumer of steam. Space heating requirements in buildings using steam from the central steam plant were extrapolated from energy simulations on the Ft. Greely school. The school was simulated using the DOE-2.1d building energy simulation program. The program was used to calculate heating loads and building energy consumption during the course of a typical meteorological year. The existing building configuration and operating conditions at the time of the field survey were modeled as the baseline conditions. The weather data for Big Delta, Alaska was used for the simulation.

Total annual steam use for space heating of applicable buildings totaled 122,170 MBtu.

- **Pipe Heat Loss** from the central steam heating distribution system and condensate return system was taken from the 1977 energy study. Heat loss remains constant throughout the year at 2,705 MBH or a total or 23,700 MBtu per year. Pipe heat loss prevents freezing of potable water and sewer pipes in the utilidors.
- Domestic Water Heating (DHW) steam use was estimated based on total steam production in July less steam use in the heating plant, pipe heat loss from the distribution system, and space heating steam use. Space heating steam use for the Fort was extrapolated from the computer model of the school. Annual energy used for DHW was estimated at 26,486 MBtu.
- Deaerator (DA) Heater in the central steam plant was estimated to consume 10% of the steam produced by the boilers.

Figure 2-3 below illustrates the distribution of annual steam use. As can be seen space heating consumes 64% of the steam produced. Total annual steam use is 190,850 MBtu. A total of 1,791,484 gallons per year of arctic fuel oil is consumed to produce the required steam. Consumption of electricity by central steam plant auxiliaries was estimated at 466,502 kWh.

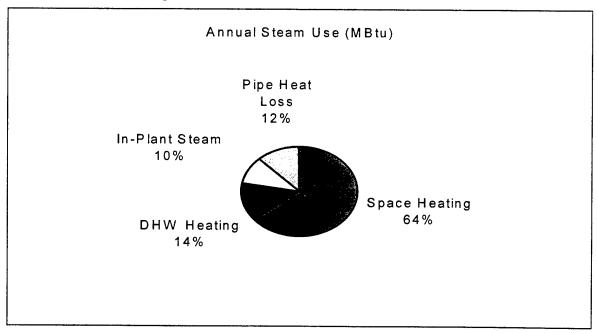


Figure 2-3. Distribution of Annual Steam Use

2.1.4 Operation and Maintenance Costs

The utilities at Fort Greely are operated by a 16 man Utility Department. The average burdened cost of personnel is about \$35 per hour according to the Business Office at Fort Greely. For the purposes of this study, the costs of O&M personnel were divided among the utilities as follows:

- Central Steam Heating System The central steam plant is manned continuously by 2 central plant operators in the winter and one operator in the summer. In addition various mechanics are required for maintenance.
- **Central Sewer System** O&M was assumed to require 100% of the water treatment mechanic's time and 15% of the foreman's time.
- **Central Water System** O&M was assumed to require 50% of the general mechanic's time and 5% of the foreman's time.

Table 2-1 below summarizes the O&M personnel costs.

Table 2-1. O&M Cost Summary

	No. of Maintenance Personnel Required				
	Steam System	Water System	Sewer System	Total Utilities	
Foreman	0.80	0.05	0.15	1.00	
Steam Fitter	1.00			1.00	
Electrician	1.00			1.00	
General Mechanic	0.50	0.50		1.00	
Water Treatment Mechanic		-	1.00	1.00	
Power Systems Mechanic	1.00			1.00	
Boiler Operators	10.00			10.00	
Subtotal	14.30	0.55	1.15	16.00	
Annual Hours per Man	1,820	1,820	1,820	1,820	
Burdened Cost per Hour	35.00	35.00	35.00	35.00	
Annual Operating Cost	910,910	35,035	73,255	1,019,200	

2.2 CENTRAL WATER SYSTEM

2.2.1 Description

The central water system consists of water wells serving facilities in the central cantonment area through a water distribution system located in utilidors.

The primary wells for the system are Well 9, located in the central steam plant, and Well 8 located east of the central steam plant. Well pumps for Wells 8 and 9 have motors of 50 and 60 horsepower, respectively. These wells are operated alternately to fill a 180,000 gallon atmospheric storage tank located within the central steam plant. In addition, there is one other well located on the system near the central heating plant which can be used to supplement the water supply. The well depths vary from 270 to 400 feet deep while the water table is about 200 feet. Chlorination is applied as the water leaves the wells. Building 501 has its own well which may be used in an emergency to supply Building 501.

Water is pumped from the storage tank into two 20,000 gallon pressure tanks by 25 and 30 horsepower pumps. The pressure tanks directly feed the water distribution system. In addition, a 50 horsepower pump is available to pump into the water distribution system from the atmospheric storage tank in the event of a fire. The water distribution system is operated at a pressure of about 55 psig.

The water distribution system consists of a potable water piping looped system located mainly in utilidors. A long section of piping in a Rickwil, pipe in pipe, system serves the sewage treatment plant. Besides serving the facilities in the central cantonment area, the water distribution system also serves fire hydrants spaced throughout the area.

Most of the water consumed is used within the buildings for normal activities. Potable water from the system is also used continuously to cool condensers in the commissary. Additional potable water is used at the sewage treatment plant.

Steam piping parallels the water distribution piping in the utilidors and Rickwil system. Heat loss from the steam piping prevents freezing of piping in the utilidors. Without steam winter operation of the existing water distribution system would be impossible.

2.2.2 Energy Consumption

Electric energy for the well and pressurization pumps is the only energy required to operate the system. Annual electric use is presented in paragraph 2.5.

2.2.3 Operation and Maintenance Costs

O&M costs are summarized in paragraph 2.1.4 above.

2.3 CENTRAL SEWER SYSTEM

2.3.1 <u>Description</u>

The central sewer system consists of a sewer system serving facilities in the central cantonment area and a sewage treatment plant to the east.

The sewer system consists of sewer piping located mainly in utilidors. A long section of piping in a Rickwil, pipe-in-pipe, system carries sewage to the sewage treatment plant. Steam piping parallels the sewer piping in the utilidors and Rickwil system. Heat loss from the steam piping prevents freezing of piping in the utilidors. Without steam, winter operation of the existing central sewer system would be impossible.

The sewage treatment plant is comprised of an Imhoff tank, sludge drying beds, aerated lagoons, and a chlorination facility. The current treatment scheme includes the following processes:

- The **Imhoff Tank** provides primary clarification and sludge stabilization. The 120,000 gallon Imhoff tank is enclosed within a heated building. Energy using equipment includes the following:
 - ♦ One sludge pump rated at 5 hp that operates approximately 1/2 hr every 10 to 14 days.
 - ♦ Two effluent pumps rated at 10 hp each, operating 3 to 4 hours per day.
 - ♦ One Imhoff exhaust fan rated at 2 hp that operates 1 hour per week.
- Aerated Lagoons provide biological treatment for effluent from the Imhoff tank. There are two aerated lagoons each approximately 200 feet long and 200 feet wide with an average operating depth of 10 feet. Air supplied by two positive displacement blowers (one duty, one standby) is delivered through diffusers mounted in a grid pattern along the floor of the each lagoon. Each blower is powered by a 30 hp motor. One blower operates continuously to prevent icing of the lagoon.
- **Sludge Drying Beds** or more accurately "freezing beds" receive sludge from the Imhoff tank. The sludge drying beds are cleaned out annually by loaders and trucks for transport to a landfill.
- A Chlorination Facility receives effluent from the aerated lagoons and provides disinfection before discharge of effluent to Jarvis Creek.

2.3.2 Energy Consumption

Electric energy is required for pumps, and for aeration at the sewage treatment plant. Annual electric use is presented in paragraph 2.5.

2.3.3 Operation and Maintenance Costs

O&M costs are summarized in paragraph 2.1.4 above.

2.4 UNIT ENERGY COSTS

The demand and energy costs for electricity delivered to Fort Greely from GVEA and Fort Wainwright were taken from data provided by Fort Wainwright personnel. Approximately 83% of the electric energy used at Fort Greely is derived from Fort Wainwright generators and wheeled over GVEA distribution lines for the cost of wheeling. The remaining 17% is purchased directly from GVEA at a cost based on their GS-2 rate schedule. Demand charges are based on the peak kW used per month, regardless of whether it is wheeled or purchased power. In order to simplify the analysis for this study, the energy costs were averaged over the one year period starting on the first day of September 1993 and ending on the last day of August 1994. The demand charge remains the same in either case. The electric rates used in this study are as follows:

- Electric demand charge: \$6.25/kW/month.
- Electric energy charge: \$0.0711 per kWh.

Arctic fuel oil for central steam plant and distributed boilers historically has been purchased at a cost of \$0.73 per gallon.

2.5 BASELINE UTILITY COST SUMMARY

Table 2-2 on the following page summarizes the baseline annual costs associated with the central utilities.

Table 2-2. Baseline Utility Costs

Utility	Annual Cost \$
Steam System	-
Fuel Oil Use (gal)	1,791,484
Electricity Use (kWh)	466,502
Electric Demand (kW)	85
Fuel Oil Cost (\$)	1,307,783
Electricity Cost (\$)	39,576
O&M Cost (\$)	910,910
Total Steam Cost (\$)	2,258,270
_	_
Water System	
Water Use (gal)	9,585,079
Electricity Use (kWh)	387,853
Electric Demand (kW)	***
Electricity Cost (\$)	27,576
O&M Cost (\$)	35,035
Chlorination Costs (\$)	4,026
Total Water Cost (\$)	66,637
	-
Sewer System	-
Effluent (gal)	7,197,281
Electricity Use (kWh)	251,919
Electric Demand (kW)	-
Electricity Cost (\$)	19,502
O&M Cost (\$)	73,255
Chlorination Costs (\$)	4,020
Total Sewer Cost (\$)	96,777
Total Utilities	-
Fuel Oil Use (gal)	1,791,484
Electricity Use (kWh)	1,106,274
Electric Demand (kW)	1,100,274
Electric Demand (KVV)	86,654
Fuel Oil Cost (\$)	1,307,783
O&M Cost (\$)	1,027,246
	i I.V.C.I.Z40

3. OPERATION OF EXISTING UTILITIES AT REDUCED CAPACITY

This section modifies the baseline central utility models to reflect the reduced mission at Fort Greely and the resulting utility operating costs are computed.

3.1 CENTRAL STEAM SYSTEM

Three options for operation of the central steam system at reduced capacity were investigated. These options are described below.

3.1.1 Central System with Abandoned Buildings Maintained at 45°F

This option would maintain indoor air temperatures within abandoned buildings at 45°F. It has been reported that buildings deteriorate rapidly in this climate without heat. A study is currently underway at Fort Wainwright regarding this subject.

The option would be implemented by lowering thermostat setpoints within the abandoned buildings. In cases where thermostats do not have the range to accommodate the desired lower temperature, they may be replaced with an inexpensive thermostat with the proper range. No other modifications would be required.

With lowered setpoints in abandoned buildings, fuel oil consumption at the central steam plant would be reduced. Pipe heat loss will be unaffected as will O&M costs. Paragraph 3.4 summarizes resulting energy and O&M costs.

3.1.2 Central System with No Heat to Abandoned Buildings

This option would require shutting off steam valves within the abandoned buildings to prevent steam use. Steam would continue to be supplied to the utilidors to prevent water and sewer pipes from freezing. This would allow fire hydrants to remain functional.

With no steam to abandoned buildings, fuel oil consumption at the central steam plant would be reduced. Pipe heat loss will be unaffected as will O&M costs. Paragraph 3.4 summarizes resulting energy and O&M costs.

3.1.3 Central System with Isolation of Selected Utilidors

This option would shut off steam to abandoned buildings and isolate selected sections of utilidors. Fire hydrants in the vicinity of abandoned buildings would no longer be operational.

The option would require shutting steam and water valves on steam pipes serving selected utilidors. Sewer pipes serving these utilidors should be cut and capped to prevent migration of sewer gasses into abandoned buildings. Abandoned utilidors should be isolated from active utilidors with partitions to prevent heat loss. Steam would continue to be supplied to the selected utilidors to prevent water and sewer pipes from freezing. This would allow fire hydrants served by selected utilidors to remain functional.

With no steam to abandoned buildings and selected utilidors, fuel oil consumption at the central steam plant would be reduced. Pipe heat loss will be reduced, but O&M costs will remain constant. Paragraph 3. 4 summarizes resulting operating costs.

3.1.4 Comparison of Central Steam System Options

Table 3-1 below presents the steam use for the baseline and the three options for reduced operation of the central steam plant.

Annual Steam Use (MBtu) Abandoned Abandoned Abandon Buildings Buildings Selected Baseline at 45 F No Heat **Utilidors** Space Heating 122,170 68,839 23.407 23,407 Water Heating 26,486 5,427 5,427 5,427 Steam Plant 19,085 9,737 5,194 3.842 Pipe Loss 23,109 23,109 23,109 9,589 Total 190,850 107,112 57,137 42,265

Table 3-1. Steam Use for Central Steam Plant Options

The following observations are evident:

- Maintaining 45°F in abandoned buildings would reduce steam use to about 57% of existing baseline use.
- Shutting off heat to abandoned buildings would reduce steam use to about 27% of existing baseline use. For this option heat loss from distribution steam piping exceeds energy used for space heating.
- Abandoning selected utilidors would save an additional 13.5 MBtu per year and would reduce steam use to about 19% of existing baseline use.

3.2 CENTRAL WATER SYSTEM

Operation of the central water system at reduced capacity should not require any modifications to the existing system. Annual water use is projected to drop from 115 to 8 million gallons per year.

Cost savings will result from reduced electricity use by well and pressurization pumps and reduced chlorination costs. Annual electricity cost attributable to the central water system would decrease in proportion to water use. Annual chlorination costs are would also decrease in proportion to water use. Paragraph 3. 4 summarizes resulting operating costs.

3.3 CENTRAL SEWER SYSTEM

Operation of the central sewer system at reduced capacity should not require any major modifications to the existing system. Annual sewage to be treated is projected to drop from 86 to 6 million gallons per year. Only one of the two existing sewage lagoons will be required with the reduced flow of effluent.

Cost savings will result from reduced electricity use for sewage treatment equipment. No other cost reductions are anticipated. Paragraph 3.4 summarizes resulting operating costs.

3.4 REDUCED CAPACITY CENTRAL UTILITY COST SUMMARY

Table 3-2 on the following page presents anticipated maintenance costs for central utilities operating at reduced capacity. The total utility staff is expected to drop from 16 to 14 people.

Table 3-2. Reduced Central Utility O&M Cost Summary

	Number of Maintenance Personnel Required				
	Steam	Water System	Sewer	Total	
	System		System	Utilities	
Foreman	0.80	0.05	0.15	1.00	
Steam Fitter	1.00			1.00	
Electrician	1.00			1.00	
General Mechanic	0.50	0.50		1.00	
Water Treatment Mechanic	-	-	1.00	1.00	
Power Systems Mechanic	1.00			1.00	
Boiler Operators	8			8	
Subtotal	12.30	0.55	1.15	14.00	
Annual Hours per Man	1,820	1,820	1,820	1,820	
Burdened Cost per Hour	35	35	35	35	
Annual Operating Cost	783,510	35,035	73,255	891,800	

Table 3-3 below summarizes the annual costs associated with the central utilities operating at reduced capacity. The most cost effective option would shut off steam to abandoned buildings and isolate selected sections of utilidors. Fire hydrants in the vicinity of abandoned buildings would no longer be operational.

Table 3-3. Utility Costs of Central Utility Systems Operating at Reduced Capacity

	Abandoned	Abandoned	Abandan	
Utility	Buildings		Abandon Selected	
Cunty	at 45 F	Buildings No Heat		
Steam System	at 40 F	No neat	Utilidors	
Fuel Oil Use (gal)	1.005.444	F20, 220	000 705	
Electricity Use (kWh)	1,005,444	536,336	396,735	
	344,794	332,179	332,179	
Electric Demand (kW) Fuel Oil Cost (\$)	39	38	38	
Electricity Cost (\$)	733,974	391,525	289,617	
	27,467	26,462	26,462	
O&M Cost (\$)	783,510	783,510	783,510	
Total Steam Cost (\$)	1,544,951	1,201,497	1,099,589	
W-4 0				
Water System				
Water Use (gal)	996,820	996,820	996,820	
Electricity Use (kWh)	40,336	40,336	40,336	
Electric Demand (kW)		-	-	
Electricity Cost (\$)	2,868	2,868	2,868	
O&M Cost (\$)	35,035	35,035	35,035	
Chlorination Costs (\$)	419	419	419	
Total Water Cost (\$)	38,322	38,322	38,322	
Sewer System				
Effluent (gal)	816,163	816,163	816,163	
Electricity Use (kWh)	251,919	251,919	251,919	
Electric Demand (kW)	-	-	-	
Electricity Cost (\$)	19,502	19,502	19,502	
O&M Cost (\$)	73,255	73,255	73,255	
Chlorination Costs (\$)	272	272	272	
Total Sewer Cost (\$)	93,029	93,029	93,029	
Total Utilities				
Fuel Oil Use (gal)	1,005,444	536,336	396,735	
Electricity Use (kWh)	637,048	624,434	624,434	
Electric Demand (kW)	39	38	38	
Electricity Cost (\$)	49,836	48,831	48,831	
Fuel Oil Cost (\$)	733,974	391,525	289,617	
O&M Cost (\$)	892,491	892,491	892,491	
Total Utilities Cost (\$)	1,676,301	1,332,847	1,230,939	

4. DISTRIBUTED UTILITY SYSTEMS

In this section distributed utility systems which provide individual heating, potable water, and sewer systems for each individual building are evaluated and resulting utility operating costs are computed.

4.1 DISTRIBUTED HEATING SYSTEMS

4.1.1 Description

This option would abandon the central steam plant and place a dedicated steam boiler and fuel oil tank at each active building. The central distribution utilidor would be abandoned. The anticipated benefits of this option are:

- Elimination of pipe heat loss in the utilidors which will exceed space heating loads of the remaining active buildings.
- Reduction of O&M costs.

A major disadvantage of this option is that is that water, sewer, and fire protection services also must be distributed or alternative freeze protection provided. It is difficult to operate central water and sewer systems without a heated utilidor system. Currently, utilidors are heated by heat loss from the central steam distribution piping.

A boiler sized to meet the space and DHW heating loads of each building was selected. Table 4-1 on page 4-2 indicates the remaining active buildings and the required boiler capacity.

Distributed boilers were assumed to produce 15 psig steam to serve the existing space and DHW systems in each building. Space within the heated envelope of each building would be required for the new boilers. Some piping modification and installation of a boiler flue would also be required.

Table 4-1. Distributed Boiler Sizing and Energy Use

Dida	5	Required Annual Consumption		umption	Annual Energy Cost		
Bldg	Building	Boiler	Fuel		Fuel		
#	Description	Capacity	Oil	Electricity	Oil	Electricity	
		(MBH)	(gal)	(kwh)	(\$)	(\$)	
501	Post HQ	754	20,080	17,870	17,590	1,2	
503	Gymnasium	1,083	28,846	17,870	25,269	1,2	
504	Fire Station	245	6,512	15,137	5,704	1,07	
605	Consolidated PW	984	26,201	22,075	22,952	1,5 ⁻	
606	Central Heating Plant	1,238	32,950	, I	28,864	1,5 N	
612	Tank Maintenance	738	19,645	, - 1	17,209	1,57	
615	Buildings & Grounds	685	18,246	17,870	15,984	•	
658	Temp. Motor Pool	1,004	26,737	17,870	23,422	N/	
725	School	2,157	57,422	32,797	' 1	1,27	
820	Housing Unit	639	17,010	17,870	50,302	2,33	
821	Housing Unit	639	17,010	17,870	14,900 14,900	1,27	
	TOTALS	9,527	253,648	203,512	222,196	1,27 11,6 3	

Two boilers are recommended for each building and each boiler sized to provide 100% of the peak demand to prevent freezing in the buildings should one boiler fail. Each building should be equipped with a simple freeze detection system consisting of a thermal switch in the heated space wired to an audible alarm or flashing light to indicate a problem.

The boilers would be fired with arctic fuel oil and a new fuel tank would be required for each building. Codes allow fuel oil tanks up to 650 gallons to be located within the heated space. However, larger underground tanks are recommended to reduce the frequency of fuel delivery. Fuel tanks ranging in capacity from 1000 to 5000 gallons were included in the cost estimates for distributed boilers.

The proposed fuel tanks hold less fuel than the existing large fuel tank and will require more fuel purchases more frequently in smaller quantities. Unit fuel prices are expected to increase by 20%.

4.1.2 Energy Consumption

This option would reduce energy consumption by eliminating central steam plant steam use for auxiliaries and by eliminating pipe heat loss in the central distribution system. Total fuel oil consumption in the central cantonment area would drop significantly. Electricity use would also be reduced. Paragraph 4.5 summarizes resulting energy costs.

4.2 DISTRIBUTED WATER SYSTEMS

4.2.1 Description

Distributed water systems would require drilling new water wells adjacent to each building and installing dedicated well pumps and pressure tanks for each building. Chlorination would not likely be required. Wells should be drilled about 250 feet deep.

The central water distribution system would be abandoned. Fire hydrants would no longer be available for fire protection. Water for fire protection would be provided by eleven 50,000 gallon cisterns spaced near active buildings.

4.2.2 Energy Consumption

Electricity use by well and booster pumps would not change over the reduced central utility option. The same amount of water pumped from the same 250 foot deep underground aquifer would be required.

4.3 DISTRIBUTED SEWAGE DISPOSAL SYSTEMS

4.3.1 <u>Description</u>

Distributed sewer systems would consist of septic tanks and drain fields serving each building. Each system would be composed of:

- Cast iron pipe extending from a connection on existing sanitary waste drain to a septic tank
- A gravity flow, two compartment septic tank sized to accommodate each buildings maximum daily flow requirements
- A distribution box to evenly distribute the effluent to each distribution pipe.
- Perforated distribution pipe buried a depth of 10 feet below the surface to avoid freezing. The perforated distribution pipe should wrapped with geotextile fabric. The backfill of each trench should be 12 inches of gravel, 3 feet of sand and the remainder to be filled with select backfill.

The area of the drain field is based upon the size of each septic tank assuming a worst condition of soil composed of clay with small amounts of sand or gravel.

4.3.2 Energy Consumption

Distributed sewage disposal systems in the form of septic systems require no energy to operate.

4.4 OPERATIONS AND MAINTENANCE COSTS

The advantage of distributed utilities at Fort Greely is that maintenance costs may be significantly reduced. O&M costs were projected as follows:

- Small distributed boilers do not require continuous manning. However, considering
 the harsh climate and the isolated location, a simple alarm system to indicate freezing
 conditions in active buildings is recommended. It is assumed that security personnel
 would be on duty to monitor alarms.
- Water wells require minimal maintenance. Chlorination will not likely be required.
- Distributed sewage disposal systems require minimal maintenance. Currently one full time mechanic is required for operation of the sewage disposal system. It is anticipated that a full time mechanic for sewage disposal will no longer be required.

It is anticipated that the utilities maintenance staff could be reduced to four people. Table 4-2 below summarizes the O&M costs.

Table 4-2. Distributed Utilities O&M Cost Summary

	Number of Maintenance Personnel Required				
	Steam	Water	Sewer	Total Utilities	
	System	System	System		
Foreman	0.60	0.3	0.1	1.00	
Steam Fitter	1.00			1.00	
Electrician					
General Mechanic	1.2	0.6		2.00	
Water Treatment Mechanic					
Power Systems Mechanic					
Boiler Operators					
Subtotal	2.80	0.90	0.30	4.00	
Annual Hours per Man	1,820	1,820	1,820		
Burdened Cost per Hour	35	35			
Annual Operating Cost	178,360	57,330	19,110	254,800	

4.5 DISTRIBUTED UTILITIES COST SUMMARY

Table 4-3 on below summarizes the annual costs associated with the distributed utility option.

Table 4-3. Distributed Utility Costs

	Annual
Utility	Cost
Steam System	_
Fuel Oil Use (gal)	270,658
Electricity Use (kWh)	221,383
Electric Demand (kW)	4
Fuel Oil Cost (\$)	197,580
Electricity Cost (\$)	17,636
O&M Cost (\$)	178,360
Total Steam Cost (\$)	393,576
	-
Water System	
Water Use (gal)	996,820
Electricity Use (kWh)	40,336
Electric Demand (kW)	-
Electricity Cost (\$)	2,868
O&M Cost (\$)	57,330
Chlorination Costs (\$)	- 60 400
Total Water Cost (\$)	60,198
Sewer System	-
Effluent (gal)	816,163
Electricity Use (kWh)	-
Electric Demand (kW)	-
Electricity Cost (\$)	-
O&M Cost (\$)	19,110
Chlorination Costs (\$)	-
Total Sewer Cost (\$)	19,110
Total Utilities	
Fuel Oil Use (gal)	270,658
Electricity Use (kWh)	261,718
Electric Demand (kW)	4
Electricity Cost (\$)	20,504
Fuel Oil Cost (\$)	197,580
O&M Cost (\$)	254,800
Total Utilities Cost (\$)	472,884

4.6 IMPLEMENTATION COSTS

Replacement of central utilities with distributed utilities will incur a substantial implementation cost. Table 4-4 below summarizes the implementation costs. Appendix E contains detailed cost estimates for installation of distributed utilities.

Table 4-4. Distributed Utility Implementation Costs

Description	Steam	Water	Sewer	Total
	(\$)	(\$)	(\$)	(\$)
Distributed Steam Boilers	778,779			778,779
Boiler Fuel Systems	388,761			388,761
Water Wells & Fire Cisterns		1,039,861		1,039,861
Septic Systems			667,277	667,277
Total Construction Cost (\$)	1,167,540	1,039,861	667,277	2,874,678
SIOH (5.5%)	64,215	57,192	36,700	158,107
Design (6%)	70,052	62,392	40,037	172,481
Total Investment Cost (\$)	1,301,807	1,159,445	744,014	3,205,266

5. MIXED UTILITY SYSTEMS

This section explores mixed utility systems which are a combination of central and distributed utilities. Steam and sewer would be converted to distributed systems and the central water system would be retained.

5.1. INTRODUCTION

Central utility systems operating at reduced capacity were evaluated in Section 3. Distributed utility systems were evaluated in Section 4. Table 5-1 below summarizes the results of the analysis for distributed utilities.

Table 5-1. Summary of Central and Distributed Utilities

Description	Steam	Water	Sewer
Onersting Coats			
Operating Costs			.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Central Utilities	1,099,589	38,322	93,029
Distributed Utilities	393,576	60,198	19,110
Distributed Utility Savings	706,013	(21,876)	73,919
Implementation Costs			
Distributed Utilities	1,301,807	1,159,445	744,014
Economics			
Simple Economic Payback (yrs)	1.84	(53.00)	10.07

As can be seen, the distributed heating systems have an excellent economic payback of about two years. In other words, operating cost savings will pay for the cost of new distributed boilers in less than two years. Distributed septic systems have an economic payback of 10 years. Distributed water systems in the form of wells and fire cisterns at each building have no economic payback due to higher O&M costs. The problem with distributed water systems is a high investment cost and no savings in operating costs.

Obviously, given the economics, the water system should remain centralized. However, it is difficult to operate central water or sewer systems without a heated utilidor system. Currently utilidors are heated by heat loss from the central steam distribution piping. The following section discusses options for freeze protection of the central water systems.

5.2. FREEZE PROTECTION OF CENTRAL WATER SYSTEMS

The freeze protection method most appropriate for Fort Greely would likely be the one with the lowest initial cost; given the uncertain future of the Fort. Possible methods of water pipe freeze protection are:

- Burial below the frost line
- Electric or steam heat trace of pipe
- Recirculation
- Heating entering water
- Circulation flow to drain
- Insulation
- Combination of the above

Burial below the frost line is not economically feasible. Heat tracing is not reliable and is costly if electricity is used. Recirculation is possible, but pipe heat loss would double due to the return loop. The recirculation method would likely require heat tracing from the mains to the buildings. These options were not considered further.

The lowest cost option for freeze protection is a combination of the next three options. Circulation flow to drain maintains the movement of water in the central water distribution piping by allowing a controlled amount of water to constantly flow down the drain in each active building. Because the entering ground water temperature is about 38°F, heating the water entering the distribution system may also be desirable. The cost effectiveness of adding insulation to water piping was also investigated.

Using the combined options described above, a model of heat loss from the water distribution piping was developed. The model calculates the temperature drop of water flowing through the pipes to active buildings and predicts the lowest water temperature in the system. A utilidor temperature of 0°F was assumed.

The freezing of water flowing in a pipe occurs in four distinct stages1:

- **Sub-cooling.** Studies show that water flowing in a pipe will not form ice above a water temperature of 22 to 24°F.
- Ice crystal formation. Below 24°F ice crystals will form in the flowing water. Water will continue to flow but at a slower rate due to increased viscosity from the ice crystals.

¹Orlando Andersland and Duwayne Anderson, Editors, <u>Geotechnical Engineering for Cold Regions</u>, McGraw-Hill.

- Annular ice formation. At some point in time after ice crystal formation, ice will begin to form on the interior surface of the pipe which will eventually block the flow.
- **Solid ice formation.** Remaining water trapped by annular ice formation will freeze creating stress in the pipe and possibly rupture the pipe.

5.3. FREEZE PROTECTION OPTIONS

Three freeze protection options were investigated:

- Circulation to Drain. This option maintained water temperatures above 28°F.
- Water Heating and Circulation to Drain. This option heated water entering the water distribution system to 60 F and maintained water temperatures above 32°F.
- Heating, Circulation to Drain, and Pipe Insulation. This option insulated water pipes, heated water entering the water distribution system to 60°F, and maintained water temperatures above 32°F.

Table 5-2 on page 5-4 summarizes analysis of the three freeze protection options. As can be seen, freeze protection of the water distribution system has a relatively small cost, adding a maximum of \$26,000 per year to operating costs. The optimal freeze protection option is dependent on the life cycle cost analysis which is presented in Section 6.

Table 5-2. Three Freeze Options

	Distributed			Water Flow
	Water	Water	Water Flow	Water Heat
	System	Flow	Water Heat	Pipe Insulation
Freeze Protection				
Required Flow Rate (gpm)	N/A	74	32	13
Annual Water Consumption (gal)	N/A	19,315,800	8,278,200	3,285,000
Annual Well Pump Electricity (kWh)	N/A	7 81,597	334,970	
Annual Electric Cost (\$)	N/A	16,489	7,067	2,804
Annual Chlorination Cost (\$)	N/A	8,125	3,482	1,382
Annual Energy Consumption (MBtu)	N/A	967	1,933	767
Annual Fuel Oil Use (gal)	N/A	9,073	18,146	7,201
Annual Fuel Oil Cost (\$)	N/A	6,623	13,247	5,257
Steam System				
Fuel Oil Use (gal)	270,658	270,658	277,725	273,462
Electricity Use (kWh)	221,383	221,383	221,383	221,383
Electric Demand (kW)	4	4	4	4
Fuel Oil Cost (\$)	197,580	202,739	202,739	199,627
Electricity Cost (\$)	17,636	17,636	17,636	17,636
O&M Cost (\$)	178,360	178,360	178,360	178,360
Total Steam Cost (\$)	393,576	393,576	398,735	395,623
Water System				
Water Use (gal)	996,820	20,312,620	9,275,020	3,285,000
Electricity Use (kWh)	40,336	821,934	375,306	132,925
Electric Demand (kW)	-	-	-	-
Electricity Cost (\$)	2,868	9,451	26,684	9,451
O&M Cost (\$)	57,330	35,035	35,035	35,035
Chlorination Costs (\$)	-	272	272	272
Total Water Cost (\$)	60,198	93,747	61,991	44,758
Sewer System				
Effluent (gal)	816,163	816,163	816,163	816,163
Electricity Use (kWh)	-	-	-	-
Electric Demand (kW)	-	-	-	-
Electricity Cost (\$)	-	-	-	-
O&M Cost (\$)	19,110	19,110	19,110	19,110
Chlorination Costs (\$)	-	-	-	-
Total Sewer Cost (\$)	19,110	19,110	19,110	19,110
Total Utilities				
Fuel Oil Use (gal)	270,658	270,658	277 <i>,</i> 725	273,462
Electricity Use (kWh)	261,718	1,043,317	596,689	354,308
Electric Demand (kW)	4	4	4	4
Electricity Cost (\$)	20,504	76,075	44,320	27,087
Fuel Oil Cost (\$)	197,580	197,580	202,739	199,627
O&M Cost (\$)	254,800	232,777	232,777	232,777
Total Utilities Cost (\$)	472,884	506,432	479,836	459,491

6. LIFE CYCLE COST ANALYSIS

6.1 METHODOLOGY

The Life Cycle Cost Analysis (LCCA) methodology used in this study comprised a present value analysis of capital costs, operational costs, and projected energy costs over a 20 year life cycle. Uniform present value (UPV) factors and escalation rates for energy costs were taken from Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis 1996, which is the current update to NIST Handbook 135. A 4.1% discount rate was used for the purpose of this study in compliance with FEMP guidelines.

6.2 LCCA RESULTS

Table 6-1 on the following page summarizes the life cycle cost analysis for the baseline and options. The option with the least life cycle cost, and the recommended option, is the mixed utilities system option: water heating, circulation to drain, and pipe insulation because of its superior reliability.

Table 6-1. Life Cycle Cost Analysis

		ŏ	Central Plant Options	Suc			Mixed Utility Ontions	ions
		Abandoned	Abandoned	Abandon		Water Flow	Water Flow	Water Flow
	Baseline	Buildings	Buildings	Selected	Distributed	Only	& Heating	Heating &
Investment Costs	2	at 10 L	IRAL INO LIERI	Offilidors	Otilities			Pipe Insulation
Distributed Steam Boilers					1100			
Boiler Fuel Systems					778,779	778,779	778,779	778,779
Water Wells & Fire Cistems					388,761	388,761	388,761	388,761
Septic Systems					1,039,801		,	
Water Distribution Heater					667,277	667,277	667,277	667,277
Water Pipe Insulation					•		19,800	19,800
Total Construction Cost (8)							•	143,267
SIOH (5 5%)	•	'	1	,	2,874,678	1,834,817	1,854,617	1,997,884
Design (6%)	,	,	•	•	158,107	100,915	102,004	109,884
Total Investment Cost (\$)		,	,	-	172,481	110,089	111,277	119.873
Annual Operating Conta		-	•		3,205,266	2,045,821	2,067,898	2.227.641
Timen operating costs		•	1					
Electricity Cost (\$)	86,654	49.836	48 831	48 831	20 504	350.97	000 11	- 100
Fuel Oil Cost (\$)	1,307,783	733.974	391.525	289 617	107 580	10,073	44,320	27,087
O&M Cost (\$)	1.027.246	892 491	892 491	802 404	254 900	000,761	202,739	199,627
Total Utilities Cost (\$)	2 421 683	1 676 301	1 332 847	4 220 020	7000,422	432,111	771,77	232,777
Life Cycle Costs	200	100,000,	1,0,200,1	1,430,939	4/2,884	506,432	479,836	459,491
Investment	•							
Flectricity	4 000	, ,	•		3,205,266	2,045,821	2,067,898	2,227,641
File Oil	1,233,887	721,131	706,591	706,591	296,687	1,100,809	641,310	391,944
	22,245,394	12,484,896	6,659,846	4,926,383	3,360,839	3,360,839	3,448,590	3.395,660
Total I for Control	13,837,000	12,021,849	12,021,849	12,021,849	3,432,156	3,135,506	3,135,506	3.135.506
oral Eile Cycle Cost (\$)	37,336,282	25,227,876	19,388,286	17,654,823	10,294,947	9,642,975	9 293 304	9 150 752

6.3 PROJECT ECONOMICS

This section presents the economic analysis of implementing the distributed utilities option as a project. Operation of existing central utilities would require little capital investment, but would incur higher than necessary operating costs. The recommended mixed utility option would require a large capital investment, but would operate more efficiently. The ECIP economic evaluation form on the following page evaluates the economics of the recommended mixed utility option relative to the most cost effective central utility option.

The results of the ECIP evaluation are a 3.1 year simple economic payback and a Savings-to-Investment Ratio (SIR) of 4.5.

FI. Greely, AI ROJECT TITLE LOC. PRO DISC. ANA INVESTMEN A. CON B. SIOH C. DES D. TOT E. SAL' F. PUB G. TOT ENERGY SA DATE OF NI: ENE SOU A. ELE: B. DIST C. NAT D. REF E. COA F. OTH G. ELE:	CATION: Ft. G OJECT TITLE: CCRETE PORTION ALYSIS DATE: NT NSTRUCTION COS OH COST SIGN COST TAL COST LVAGE VALUE OF BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	Replace (NAME: 03/25/90 ST = EXISTING EQUIPI IPANY REBATE =	ENERGY CONSE Central Utilities with D TOTAL 6 (5.5% of 1A) = (6.0% of 1A) = (1A +1B +1C) = MENT = (1D -1E -1F) = T FACTORS: ENERGY SAVINGS (418,883) kW	CLE COST ANALYSIS RVATION INVESTMENT istributed Utilities ECONOMIC LIFE SAVINGS (MBtu)	REGION: 4 20 ANNUAL \$	OCT '94 DISCOUNT FACTOR (4)	5. PROJECT NUM PROJECT NO: FISCAL YEAR: PREPARED BY: \$1,997,884 \$109,884 \$119,873 \$2,227,641 ———> DISCOUNTED SAVINGS (5)	1413-001 1995 D Jones \$2,227,6
FI. Greely, AI ROJECT TITLE LOC. PRO DISC. ANA INVESTMEN A. CON B. SIOH C. DES D. TOT E. SAL' F. PUB G. TOT ENERGY SA DATE OF NI: ENE SOU A. ELE: B. DIST C. NAT D. REF E. COA F. OTH G. ELE:	CATION: FL G OJECT TITLE: CCRETE PORTION ALYSIS DATE: NT NSTRUCTION COS OH COST TAL COST LAVAGE VALUE OF BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	Replace (NAME: 03/25/90 ST = EXISTING EQUIPI PANY REBATE = D FOR DISCOUNT FUEL COST \$0.0711 (\$/kWh)	LIFE CY/ ENERGY CONSEI Central Utilities with D TOTAL 6 (5.5% of 1A) = (6.0% of 1A) = (1A +1B +1C) = MENT = (1D -1E -1F) = T FACTORS: ENERGY SAVINGS (418,883) kW	CLE COST ANALYSIS RVATION INVESTMENT istributed Utilities ECONOMIC LIFE SAVINGS (MBtu)	ANNUAL \$ SAVINGS	OCT '94 DISCOUNT FACTOR (4)	PROJECT NO: FISCAL YEAR: PREPARED BY: \$1,997,884 \$109,884 \$119,873 \$2,227,641 > DISCOUNTED SAVINGS (5)	1413-001 1995 D Jones \$2,227,6
LOC PRO DISC ANA INVESTMEN A. CON B. SIOH C. DES D. TOT E. SAL' F. PUB G. TOT ENERGY SA DATE OF NII ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	CATION: Ft. G OJECT TITLE: CCRETE PORTION ALYSIS DATE: NT NSTRUCTION COS OH COST SIGN COST TAL COST LVAGE VALUE OF BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	Replace (NAME: 03/25/90 ST = EXISTING EQUIPI PANY REBATE = D FOR DISCOUNT FUEL COST \$0.0711 (\$/kWh)	LIFE CY/ ENERGY CONSEI Central Utilities with D TOTAL 6 (5.5% of 1A) = (6.0% of 1A) = (1A +1B +1C) = MENT = (1D -1E -1F) = T FACTORS: ENERGY SAVINGS (418,883) kW	CLE COST ANALYSIS RVATION INVESTMENT istributed Utilities ECONOMIC LIFE SAVINGS (MBtu)	ANNUAL \$ SAVINGS	OCT '94 DISCOUNT FACTOR (4)	PROJECT NO: FISCAL YEAR: PREPARED BY: \$1,997,884 \$109,884 \$119,873 \$2,227,641 > DISCOUNTED SAVINGS (5)	1413-001 1995 D Jones \$2,227,6
LOC PRO DISC ANA INVESTMEN A. CON B. SIOH C. DES D. TOT E. SAL' F. PUB G. TOT ENERGY SA DATE OF NII ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	CATION: Ft. G OJECT TITLE: CCRETE PORTION ALYSIS DATE: NT NSTRUCTION COS OH COST SIGN COST TAL COST LVAGE VALUE OF BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	Replace (NAME: 03/25/90 ST = EXISTING EQUIPI PANY REBATE = D FOR DISCOUNT FUEL COST \$0.0711 (\$/kWh)	LIFE CY/ ENERGY CONSEI Central Utilities with D TOTAL 6 (5.5% of 1A) = (6.0% of 1A) = (1A +1B +1C) = MENT = (1D -1E -1F) = T FACTORS: ENERGY SAVINGS (418,883) kW	CLE COST ANALYSIS RVATION INVESTMENT istributed Utilities ECONOMIC LIFE SAVINGS (MBtu)	ANNUAL \$ SAVINGS	OCT '94 DISCOUNT FACTOR (4)	PROJECT NO: FISCAL YEAR: PREPARED BY: \$1,997,884 \$109,884 \$119,873 \$2,227,641 > DISCOUNTED SAVINGS (5)	1413-001 1995 D Jones \$2,227,6
INVESTMEN A. CON B. SIOH C. DES D. TOT E. SALL F. PUB G. TOT ENERGY SA DATE OF NIT ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	OJECT TITLE: CRETE PORTION ALYSIS DATE: NT NSTRUCTION COS OH COST SIGN COST TAL COST LVAGE VALUE OF BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	Replace (NAME: 03/25/90 ST = EXISTING EQUIPI IPANY REBATE = OST (-): D FOR DISCOUNT FUEL COST \$0.0711 (\$/kWh)	ENERGY CONSE Central Utilities with D TOTAL 6 (5.5% of 1A) = (6.0% of 1A) = (1A +1B +1C) = MENT = (1D -1E -1F) = T FACTORS: ENERGY SAVINGS (418,883) kW	istributed Utilities ECONOMIC LIFE SAVINGS (MBtu)	ANNUAL \$ SAVINGS	OCT '94 DISCOUNT FACTOR (4)	\$1,997,884 \$109,884 \$119,873 \$2,227,641	1995 D Jones \$2,227,6
INVESTMEN A. CON B. SIOH C. DES D. TOT E. SALL F. PUB G. TOT ENERGY SA DATE OF NIT ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	OJECT TITLE: CRETE PORTION ALYSIS DATE: NT NSTRUCTION COS OH COST SIGN COST TAL COST LVAGE VALUE OF BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	Replace (NAME: 03/25/90 ST = EXISTING EQUIPI IPANY REBATE = OST (-): D FOR DISCOUNT FUEL COST \$0.0711 (\$/kWh)	ENERGY CONSE Central Utilities with D TOTAL 6 (5.5% of 1A) = (6.0% of 1A) = (1A +1B +1C) = MENT = (1D -1E -1F) = T FACTORS: ENERGY SAVINGS (418,883) kW	istributed Utilities ECONOMIC LIFE SAVINGS (MBtu)	ANNUAL \$ SAVINGS	OCT '94 DISCOUNT FACTOR (4)	\$1,997,884 \$109,884 \$119,873 \$2,227,641	1995 D Jones
INVESTMEN A. CON B. SIOH C. DES D. TOT E. SALL F. PUB G. TOT ENERGY SA DATE OF NIT ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	OJECT TITLE: CRETE PORTION ALYSIS DATE: NT NSTRUCTION COS OH COST SIGN COST TAL COST LVAGE VALUE OF BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	Replace (NAME: 03/25/90 ST = EXISTING EQUIPI IPANY REBATE = OST (-): D FOR DISCOUNT FUEL COST \$0.0711 (\$/kWh)	Central Utilities with D TOTAL 6 = (5.5% of 1A) = (6.0% of 1A) = (1A +1B +1C) = MENT = (1D -1E -1F) = T FACTORS: ENERGY SAVINGS (418,883) kW	ECONOMIC LIFE SAVINGS (MBtu)	ANNUAL \$	OCT '94 DISCOUNT FACTOR (4)	\$1,997,884 \$109,884 \$119,873 \$2,227,641	1995 D Jones \$2,227,6
INVESTMEN A. CON B. SIOH C. DES D. TOT E. SALL F. PUB G. TOT ENERGY SA DATE OF NIT ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	OJECT TITLE: CRETE PORTION ALYSIS DATE: NT NSTRUCTION COS OH COST SIGN COST TAL COST LVAGE VALUE OF BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	Replace (NAME: 03/25/90 ST = EXISTING EQUIPI IPANY REBATE = OST (-): D FOR DISCOUNT FUEL COST \$0.0711 (\$/kWh)	TOTAL 6 = (5.5% of 1A) = (6.0% of 1A) = (1A +1B +1C) = MENT = (1D -1E -1F) = T FACTORS: ENERGY SAVINGS (418,883) kW	ECONOMIC LIFE SAVINGS (MBtu)	ANNUAL \$ SAVINGS	OCT '94 DISCOUNT FACTOR (4)	\$1,997,884 \$109,884 \$119,873 \$2,227,641	1995 D Jones \$2,227,6
INVESTMEN A. CON B. SIOH C. DES D. TOT E. SALL F. PUB G. TOT ENERGY SA DATE OF NIT ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	OJECT TITLE: CRETE PORTION ALYSIS DATE: NT NSTRUCTION COS OH COST SIGN COST TAL COST LVAGE VALUE OF BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	Replace (NAME: 03/25/90 ST = EXISTING EQUIPI IPANY REBATE = OST (-): D FOR DISCOUNT FUEL COST \$0.0711 (\$/kWh)	TOTAL 6 = (5.5% of 1A) = (6.0% of 1A) = (1A +1B +1C) = MENT = (1D -1E -1F) = T FACTORS: ENERGY SAVINGS (418,883) kW	ECONOMIC LIFE SAVINGS (MBtu)	ANNUAL \$ SAVINGS	OCT '94 DISCOUNT FACTOR (4)	\$1,997,884 \$109,884 \$119,873 \$2,227,641	1995 D Jones \$2,227,6
INVESTMEN A. CON B. SIOH C. DES D. TOT E. SAL' F. PUB G. TOT ENERGY SA DATE OF NIC ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	CRETE PORTION ALYSIS DATE: NT NSTRUCTION COS OH COST SIGN COST TAL COST LVAGE VALUE OF BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE	NAME: 03/25/90 ST = EXISTING EQUIPI IPANY REBATE = DET (-): D FOR DISCOUNT FUEL COST \$0.0711 (\$/kWh)	TOTAL 6 = (5.5% of 1A) = (6.0% of 1A) = (1A +1B +1C) = MENT = (1D -1E -1F) = T FACTORS: ENERGY SAVINGS (418,883) kW	ECONOMIC LIFE SAVINGS (MBtu)	ANNUAL \$ SAVINGS	OCT '94 DISCOUNT FACTOR (4)	\$1,997,884 \$109,884 \$119,873 \$2,227,641	D Jones \$2,227,6
INVESTMEN A. CON B. SIOH C. DES D. TOT E. SAL' F. PUB G. TOT ENERGY SA DATE OF NII ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	ALYSIS DATE: NT NSTRUCTION COS OH COST SIGN COST TAL COST LVAGE VALUE OF BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	O3/25/94 ST = EXISTING EQUIPI IPANY REBATE = OST (-): D FOR DISCOUNT FUEL COST \$0.0711 (\$/kWh)	6 = (5.5% of 1A) = (6.0% of 1A) = (1A +1B +1C) = MENT = (1D -1E -1F) = TFACTORS: ENERGY SAVINGS (418,883) kW	SAVINGS (MBtu)	ANNUAL \$ SAVINGS	OCT '94 DISCOUNT FACTOR (4)	\$1,997,884 \$109,884 \$119,873 \$2,227,641 ———> DISCOUNTED SAVINGS (5)	\$2,227,6
INVESTMEN A. CON B. SIOH C. DES D. TOT E. SAL' F. PUB G. TOT ENERGY SA DATE OF NII C. NAT D. REF E. COA F. OTH G. ELE	NT NSTRUCTION COS OH COST SIGN COST TAL COST LVAGE VALUE OF BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	EXISTING EQUIPI IPANY REBATE = DET (-): DET FOR DISCOUNT FUEL COST \$0.0711 (\$/kWh)	= (5.5% of 1A) = (6.0% of 1A) = (1A +1B +1C) = MENT = (1D -1E -1F) = TFACTORS: ENERGY SAVINGS (418,883) kW	SAVINGS (MBtu)	ANNUAL \$ SAVINGS	DISCOUNT FACTOR (4)	\$109,884 \$119,873 \$2,227,641 ———> DISCOUNTED SAVINGS (5)	<u>,</u>
A. CON B. SIOH C. DES D. TOT E. SAL' F. PUB G. TOT ENERGY SA DATE OF NI: ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	NSTRUCTION COS SIGN COST TAL COST LVAGE VALUE OF BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	EXISTING EQUIPI IPANY REBATE = OST (-): D FOR DISCOUNT FUEL COST \$0.0711 (\$/kWh)	(5.5% of 1A) = (6.0% of 1A) = (1A+1B+1C) = MENT = (1D-1E-1F) = T FACTORS: ENERGY SAVINGS (418,883) kW	(MBtu)	ANNUAL \$ SAVINGS	DISCOUNT FACTOR (4)	\$109,884 \$119,873 \$2,227,641 ———> DISCOUNTED SAVINGS (5)	<u>,</u>
B. SIOH C. DES D. TOT E. SAL' F. PUB G. TOT ENERGY SA DATE OF NI ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	OH COST SIGN COST TAL COST LVAGE VALUE OF BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	EXISTING EQUIPI IPANY REBATE = OST (-): D FOR DISCOUNT FUEL COST \$0.0711 (\$/kWh)	(5.5% of 1A) = (6.0% of 1A) = (1A+1B+1C) = MENT = (1D-1E-1F) = T FACTORS: ENERGY SAVINGS (418,883) kW	(MBtu)	ANNUAL \$ SAVINGS	DISCOUNT FACTOR (4)	\$109,884 \$119,873 \$2,227,641 ———> DISCOUNTED SAVINGS (5)	<u>,</u>
C. DES D. TOT E. SAL' F. PUB G. TOT ENERGY SA DATE OF NII ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	SIGN COST TAL COST LVAGE VALUE OF BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE	PANY REBATE = DEST (-): DEFORE DISCOUNTE FUEL COST \$0.0711 (\$/kWh)	(6.0% of 1A) = (1A +1B +1C) = MENT = (1D -1E -1F) = T FACTORS: ENERGY SAVINGS (418,883) kW	(MBtu)	ANNUAL \$ SAVINGS	DISCOUNT FACTOR (4)	\$119,873 \$2,227,641 ——> DISCOUNTED SAVINGS (5)	<u>,</u>
D. TOT E. SAL' F. PUB G. TOT ENERGY SA DATE OF NII ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	TAL COST LVAGE VALUE OF BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	PANY REBATE = DEST (-): DEFORE DISCOUNTE FUEL COST \$0.0711 (\$/kWh)	(1A +1B +1C) = MENT = (1D -1E -1F) = T FACTORS: ENERGY SAVINGS (418,883) kW	(MBtu)	ANNUAL \$ SAVINGS	DISCOUNT FACTOR (4)	\$2,227,641 > DISCOUNTED SAVINGS (5)	<u>,</u>
E. SAL' F. PUB G. TOT ENERGY SA DATE OF NII ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	LVAGE VALUE OF BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	PANY REBATE = DEST (-): DEFORE DISCOUNTE FUEL COST \$0.0711 (\$/kWh)	MENT = (1D -1E -1F) = T FACTORS: ENERGY SAVINGS (418,883) kW	(MBtu)	ANNUAL \$ SAVINGS	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	<u>,</u>
F. PUB G. TOT ENERGY SA DATE OF NII ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	BLIC UTILITY COM TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	PANY REBATE = DEST (-): DEFORE DISCOUNTE FUEL COST \$0.0711 (\$/kWh)	(1D -1E -1F) = T FACTORS: ENERGY SAVINGS (418,883) kW	(MBtu)	ANNUAL \$ SAVINGS	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	<u>, , , , , , , , , , , , , , , , , , , </u>
G. TOT ENERGY SA DATE OF NII ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	TAL INVESTMENT AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	DST (-): D FOR DISCOUNT FUEL COST \$0.0711 (\$/kWh)	(1D -1E -1F) = T FACTORS: ENERGY SAVINGS (418,883) kW	(MBtu)	ANNUAL \$ SAVINGS	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	<u>,</u>
ENERGY SA DATE OF NII ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	AVINGS (+) OR CO IISTR-4942-1 USEI ERGY URCE ECTRICITY	DST (-): D FOR DISCOUNT FUEL COST \$0.0711 (\$/kWh)	T FACTORS: ENERGY SAVINGS (418,883) kW	(MBtu)	ANNUAL \$ SAVINGS	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	<u>,</u>
DATE OF NIX ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	IISTR-4942-1 USEI ERGY URCE ECTRICITY	D FOR DISCOUNT FUEL COST \$0.0711 (\$/kWh)	ENERGY SAVINGS (418,883) kW	(MBtu)	ANNUAL \$ SAVINGS	DISCOUNT FACTOR (4)	SAVINGS (5)	
DATE OF NIX ENE SOU A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	IISTR-4942-1 USEI ERGY URCE ECTRICITY	D FOR DISCOUNT FUEL COST \$0.0711 (\$/kWh)	ENERGY SAVINGS (418,883) kW	(MBtu)	ANNUAL \$ SAVINGS	DISCOUNT FACTOR (4)	SAVINGS (5)	
A. ELE- B. DIST C. NAT D. REF E. COA F. OTH G. ELE-	ERGY URCE ECTRICITY	FUEL COST \$0.0711 (\$/kWh)	ENERGY SAVINGS (418,883) kW	(MBtu)	ANNUAL \$ SAVINGS	DISCOUNT FACTOR (4)	SAVINGS (5)	
A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	URCE ECTRICITY	COST \$0.0711 (\$/kWh)	SAVINGS (418,883) kW	(MBtu)	SAVINGS	FACTOR (4)	SAVINGS (5)	
A. ELE B. DIST C. NAT D. REF E. COA F. OTH G. ELE	ECTRICITY	\$0.0711 (\$/kWh)	(418,883) kW	•				
B. DIST C. NAT D. REF E. COA F. OTH G. ELE					1329.7031	14.47	(\$430,954)	
C. NAT D. REF E. COA F. OTH G. ELE	• •		126,078 gal	16,959	\$92,037	17.01	\$1,565,545	
D. REF E. COA F. OTH G. ELE	T GAS	v., v (v, g)	,,					
F. OTH G. ELE								
G. ELE	AL							
	HER							
	EC DEMAND	75.00 (\$/kW)	34 kW		\$2,563	14.47	\$ 37, 0 90	
н. тот	TAL				\$ 64,817		>	\$1,171,6
MON ENERG	OV CAVINGO () C	ND COST ()						
	RGY SAVINGS (+) C NUAL RECURRING					\$ 659,714		
	DISCOUNT FACTO			(From Table A) =		13.47		
	DISCOUNTED SAV		(-)	(3A x 3A1) =			\$8,886,343	
		, ,						
B. NON	N-RECURRING (+/	<i>(-</i>)						
ITE	EM		SAVINGS (+)	YEAR OF		DISCOUNT	DISCOUNTED	
			COST(-) (1)	OCCURRENCE (2)		FACTOR (3)	SAVINGS/COST	(4)
						(TABLE B)		
a.								
b.								
C.								
	TOTAL							# 0 000 0
C. TOT	TAL NON-ENERGY	r discounted S.	AVINGS (+) OR COS	I (-)	(3A2 + 3Bd4) =		\$8,886,3
FIRST YEAF	R DOLLAR SAVING	GS (+) / COSTS (-))		(2H3+3A+(3E	d1/Economic l	.ife))	\$724,5
			, < 10 YEARS TO QUA		•	(1G/4) =		3
	T DISCOUNTED SA					(2H5 + 3C) =		\$10,058,0
DISCOUNTE						(6/1G) =		4

7. SUMMARY AND RECOMMENDATIONS

7.1. SUMMARY

The following utility options were analyzed:

- **Baseline.** The baseline reflects the current operating costs of the utilities at existing operational levels.
- Reduced Central Utilities with Abandoned Buildings Heated to 45°F. This option assumes continued operation of the central utilities to serve active buildings and to provide heat to utilidors and abandoned buildings to prevent deterioration.
- Reduced Central Utilities with Abandoned Buildings Not Heated. This option assumes continued operation of the central utilities to serve active buildings and to provide heat to utilidors to prevent freezing of water and sewer pipes.
- Reduced Central Utilities Serving Only Active Buildings and Selected Utilidors.
 This option assumes continued operation of the central utilities to serve active
 buildings and to provide heat to only those utilidors serving the active buildings.
 Steam, water, and sewer pipes in inactive utilidors would be isolated and drained.
 Fire hydrants served by inactive utilidors would not be operational.
- Distributed Utilities. This option would provide individual boilers, wells, and septic systems for each individual active building. All utilidors and existing fire hydrants would be abandoned. Underground cisterns for fire protection would be provided in selected locations.
- Mixed Utilities. This option combined distributed heating and sewer systems with a central water system. Three options for freeze protection were evaluated:
 - 1. **Circulation to Drain.** This option maintained water distribution temperatures above 28°F.
 - 2. **Heating and Circulation to Drain.** This option heated water entering the distribution system to 60°F and maintained water temperatures above 32°F.
 - 3. **Heating, Circulation to Drain, and Pipe Insulation.** This option insulated water pipes, heated water entering the distribution system to 60°F, and maintained water temperatures above 32°F.

Figure 7-1 below presents the results of the life cycle analysis.

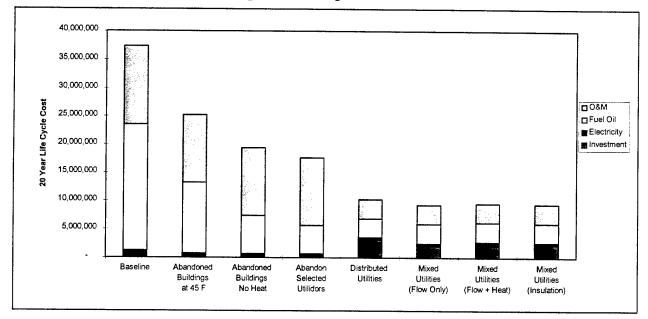


Figure 7-1. Graphical LCCA

7.2. RECOMMENDATIONS

The mixed utilities option with potable water freeze protection by water heating, circulation to drain, and pipe insulation is recommended. The following modifications are required:

- The central steam plant would be abandoned.
- Each remaining active building should be fitted with a steam boiler and fuel oil tank.
 Existing HVAC and DHW heating equipment in each building should be connected to the new steam source.
- Each remaining active building should be fitted with a septic tank and drain field.
- The portion of the existing central water system serving active buildings should be retained. The existing well and storage tanks within the central steam plant should be retained. Freeze protection should be provided for the central water system in the form of water heating, circulation to drain, and pipe insulation. Water flow for freeze protection would be recycled to the earth through the proposed septic system.

It should be noted that fire hydrants near active buildings will still be functional, but fire hydrants in the vicinity of abandoned buildings will not.

The cost of the above modifications is estimated at \$2,227,641. Economic comparison of the recommended option to the most cost effective central plant option indicates a 3.1 year simple economic payback and a Savings-to-Investment Ratio (SIR) of 4.5.

APPENDIX A SCOPE OF WORK AND CONFIRMATION NOTICES

SCOPE OF WORK ENERGY EFFICIENCY STUDY FOR FORT GREELY ALASKA

Performed as part of the ENERGY ENGINEERING ANALYSIS PROGRAM (EEAP)

GENERAL SCOPE OF WORK CONTRACT NO. DACA85-94-C-0033 Delivery Order No. 0003

ENERGY EFFICIENCY STUDY FORT GREELY, AK performed as part of the ENERGY ENGINEERING ANALYSIS PROGRAM (EEAP)

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5.0 PROJECT DOCUMENTATION

- 5.1. ECIP Projects
- 5.2. Non-ECIP Projects
- 5.3. Non-Feasible ECOs

6.0 DETAILED SCOPE OF WORK

7.0 WORK TO BE ACCOMPLISHED

- 7.1. Review Previous Studies
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- 7.3. Revaluate Selected Projects
- 7.4. Evaluate Selected ECOs
- 7.5. Combine ECOs Into Recommended Projects
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ANNEXES

- A DETAILED SCOPE OF WORK POWER DISTRIBUTION
- **B EXECUTIVE SUMMARY GUIDELINE**
- C REOUIRED DD FORM 1391 DATA
- D DETAILED SCOPE OF WORK STEAM, WATER, SANITARY SEWER

- 1.0 BRIEF DESCRIPTION OF WORK: The Architect-Engineer (A/E) shall:
- 1.1. Perform a limited site survey of specific buildings or areas to collect all data required to evaluate the specific ECOs included in this study.
 - 1.2. Provide project documentation for recommended ECOs as detailed herein.
- 1.3. Prepare a comprehensive report to document all work performed, the results and all recommendations.

2.0 GENERAL:

- 2.1. This study is limited to the evaluation of the specific buildings, systems, or ECOs listed in the DETAILED SCOPES OF WORK, Annexes A and D.
- 2.2. The information and analysis outlined herein are considered to be minimum requirements for adequate performance of this study.
- 2.3. For the buildings, systems or ECOs listed in Annex A, all methods of energy conservation which are reasonable and practical shall be considered, including improvements of operational methods and procedures as well as the physical facilities. All energy conservation opportunities which produce energy or dollar savings shall be documented in this report. Any energy conservation opportunity considered infeasible shall also be documented in the report with reasons for elimination.
- 2.4. The study shall consider the use of all energy sources applicable to each building, system, or ECO.
- 2.5. The "Energy Conservation Investment Program (ECIP) Guidance", establishes criteria for ECIP projects and shall be used for performing the ecomonic analyses of all ECOs and projects. A computer program, Life Cycle Cost In Design (LCCID), has been developed for performing life cycle cost calculations in accordance with ECIP guidelines and is referenced in the ECIP Guidance. This program is available commercially from the BLAST Support Office in Urbanna, Illinois. The BLAST Support Office can be contacted at 1-800-842-5278. The latest version of the program should be used. If any program other than LCCID is proposed for life cycle cost analysis, it must use the mode of calculation specified in the ECIP Guidance. The output must be in the format of the ECIP LCCA summary sheet, and it must be submitted for approval prior to use.
- 2.6 Energy conservation opportunites determined to be technically and economically feasible shall be developed into projects acceptable to installation personnel. This may involve combining similar ECOs into larger packages which will qualify for ECIP or MCA funding, and determining in coordination with installation personnel the appropriate packaging and implementation approach for all feasible ECOs.

3.0 PROJECT MANAGEMENT:

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3.1. Project Managers:

- 3.1.1 <u>Project Manager</u>: The A/E shall designate a project manager to serve as a point of contact and liaison for work required under this contract. Upon award of this contract, the individual shall be immediately designated in writing. This designated individual shall be responsible for coordination of work required under this contract.
- 3.1.2 <u>Design Manager</u>: The Contracting Officer will designate a design manager to serve as the Government's point of contact and liaison for all work required under this contract.
- 3.2. <u>Installation Assistance</u>: The Director of Public Works or authorized representative will designate an individual to assist the A/E in obtaining information and establishing contacts necessary to accomplish the work required under this contract.
- 3.3. <u>Public Disclosures</u>: The A/E shall make no public announcements or disclosures relative to information contained or developed in this contract, except as authorized by the Contracting Officer.
- 3.4. <u>Meetings</u>: Meetings will be scheduled whenever requested by the A/E or the Design Manager for the resolution of questions or problems encountered in the performance of the work. The A/E's project manager and the design manager shall be required to attend and participate in all meetings pertinent to the work required under this contract. These meetings, if necessary, are in addition to the presentation and review conferences.
- 3.5. <u>Site Visits, Inspections, and Investigations</u>: The A/E shall visit and inspect/investigate the site of the project as necessary and required during the preparation and accomplishment of the work.

3.6. Conferences and Confirmation Notices:

- 3.6.1. The A/E shall provide a record of all significant conferences, meetings, discussions, verbal directions, telephone conversations, etc., with Government representative(s) relative to this contract in which the A/E and/or designated representative(s) thereof participated. These records shall be dated and shall identify the contract number, and modification number if applicable, participating personnel, subject discussed and conclusions reached. the A/E shall forward to the Design Manager within ten calendar days, a reproducible copy of the records.
- 3.6.2. The A/E shall provide a record of requests for and/or receipt of Government-furnished material, data, documents, information, etc., which if not furnished in a timely manner, would significantly impair the normal progression of the work under this contract. The records shall be dated and shall identify the contract number and modification number, if applicable. The A/E shall forward to the Design Manager within ten calendar days, a reproducible copy of the record of request or receipt of material.
- 3.6.3. A review conference will be scheduled approximately 28 days after submittals. Review comments will be provided at this conference. These comments will become part of the conference minutes forwarded to the A-E and annotated with conference action. Review comments provided to the A-E will not necessarily show coordination requirements with other parts of the

submittal. The A-E shall incorporate the review comments into each part of the submittal as necessary.

- 3.7. <u>Interview</u>: The A/E shall conduct entry and exit interviews with the Director of Public Works or designated representative before starting work at the installation and after completion of the field work. The Design Manager shall schedule the interviews at least one week in advance and shall be in attendance.
- 3.7.1. Entry: The entry interview shall describe the intended procedures for the survey and shall be conducted prior to commencing work at the facility. As a minimum, the interview shall cover the following points:
 - a. Schedules
 - b. Names of energy analysts who will be conducting the site survey.
 - c. Proposed working hours.
 - d. Support requirements from the Directorate of Public Works.
- 3.7.2. Exit: The exit interview shall be conducted when the field work is complete and briefly describe the items surveyed and probable areas of energy conservation.
- 4.0 <u>SERVICES AND MATERIALS</u>: All services, materials (except those specifically enumerated to be furnished by the Government), plant, labor, supervision and travel necessary to perform the work and render the data required under this contact are included in the lump sum price of the contract.
- 5.0 PROJECT DOCUMENTATION: All energy conservation opportunities which the A/E has considered shall be included in one of the following categories and presented in the report as such:
- 5.1. ECIP Projects: To qualify as an ECIP Project, an ECO, or several ECOs which have been combined, must have a construction cost estimate greater than \$300,000. The overall project and each discrete part of the project shall have an SIR greater than 1.25. Projects which qualify for ECIP funding shall be identified, separately listed, and prioritized by the Saving to Investment Ratio (SIR). Programming documentation shall consist of a DD Form 1391, life cycle cost analysis (LCCA) summary sheet(s) (with necessary backup data to verify the numbers presented), and a Project Development Brochure (PDB). A life cycle cost analysis summary sheet shall be developed for each ECO and for the overall project when more than one ECO are combined. The energy savings for projects consisting of multiple ECOs must take into account the synergistic effects of the individual ECOs.
- 5.2. NON-ECIP Projects: Projects which do not meet ECIP criteria, but which have an SIR greater than 1.25 shall be documented and ranked in order of highest to lowest SIR. Projects or ECOs shall be provided with the following documentation: the life cycle cost analysis (LCCA) summary sheet completely filled out; a description of the work to be accomplished; backup data for the LCCA, ie; energy savings calculations and cost estimate(s); and the simple payback period. The energy savings for projects consisting of multiple ECOs must take into account there synergistic effects of the individual ECOs. In addition these projects shall have the necessary documentation prepared, as required by the Government's representative, for one of the following categories:

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- a. Regular Military Construction Army (MCA) Program. This program is for projects which have a total cost greater than \$300,000.00 and a simple payback period of ten to twenty-five years. Documentation shall consist of DD Form 1391 and a Project Development Brochure.
- b. <u>Low Cost/No Cost Projects</u>. These are projects which the Directorate of Public Works (DPW) can perform using its resources. Documentation shall be as required by DPW.
- 5.3. <u>Nonfeasible ECOs</u>: All ECOs which the A/E has considered but which are not feasible, shall be documented in the report with reasons and justifications showing why they were rejected.
- 6.0 <u>DETAILED SCOPE OF WORK</u>: The Detailed Scope of Work is contained in Annex A and Annex D.

7.0 WORK TO BE ACCOMPLISHED:

- 7.1. Review Previous Studies: Not Used.
- 7.2. <u>Perform a Limited Site Survey</u>: The A/E shall obtain all necessary data to evaluate the ECOs or projects by conducting a site survey. The A/E shall document his site survey on forms developed for the survey, or standard forms, and submit these completed forms as part of the report. All test and/or measurement equipment shall be properly calibrate prior to its use.
 - 7.3. Revaluate Selected Projects: Not Used.
 - 7.4. Evaluate Selected ECOs: As described in Detailed Scope of Work.
- 7.5. Combine ECOs Into Recommended Projects: At the interim review conference, the A/E will be provided direction of the packaging or the combining of ECOs for programming purposes and also indicate the fiscal year for which the programming or implementation documentation shall be prepared. Some projects may be a combination of several ECO's, and others may contain only one.
- 7.6. <u>Submittals</u>: The work accomplished shall be fully documented by a comprehensive report. The report shall have a table of contents and shall be indexed. Tabs and dividers shall clearly and distinctly divide sections, subsections, and appendices. All pages shall be numbered. Names of the persons primarily responsible for the project shall be included.
- 7.6.1. <u>Interim Submittal</u>: An interim report shall be submitted for review after the field survey has been completed and an analysis has been performed on all of the ECOs. The report shall indicate the work which has been accomplished to date, illustrate the methods and justifications of the approaches taken and contain a plan of the work remaining to complete the study. Calculations showing energy and dollar savings, SIR, and simple payback period of all the ECOs shall be included. The survey forms completed during this audit shall be submitted with this report. The survey forms only may be submitted in final form with this submittal. They should be clearly marked at the time of submission that they are to be retained. They shall be bound separately in a

- standard three-ring binder. The A/E shall submit the Scope of Work and any modifications to the Scope of Work as an appendix to the report. A narrative summary describing the work and results to date shall be a part of this submittal. The final report and all appendices shall be bound in standard three-ring binders which will allow repeated disassembly and reassembly.
- 7.6.2. Final Submittal: The A/E shall prepare and submit the final report when all sections of the report are 100% complete and all comments from the interim submittal have been resolved. The A/E shall submit the Scope of Work for the study and any modifications to the scope of Work as an appendix to the submittal. The report shall contain a narrative summary of conclusions and recommendations, together with all raw and supporting data, methods used, and sources of information. The report shall integrate all aspects of the study. The recommended projects, as determined in accordance with paragraph 5, shall be presented in order of priority by SIR. The final report and all appendices shall be bound in standard three-ring binders which will allow repeated disassembly and reassembly. The final report shall be arranged to include:
 - a. An Executive Summary to give a brief overview of what was accomplished and the results of this study using graphs, tables and charts as much as possible (See Annex B for minimum requirements).
 - b. The narrative report describing the problem to be studied, the approach to be used, and the results of this study.
 - c. Documentation for the recommended projects (includes LCCA Summary Sheets).
 - d. Appendices to include as a minimum:
 - 1) Energy cost development and backup data
 - 2) Detailed calculations
 - 3) Cost estimates
 - 4) Computer printouts (where applicable)
 - 5) Scope of Work
- 7.7 <u>Presentation</u>: The A/E shall give a formal presentation of the interim submittal to the installation, command, and other Government personnel. Slides or view graphs showing the results of the study to date shall be used during the presentation. During the presentation, the personnel in attendance shall be given ample opportunity to ask questions and discuss any changes deemed necessary to the study. The presentation will be conducted the same day as the review conference.

ANNEX A

DETAILED SCOPE OF WORK (REVISED) CONTRACT NO. DACA85-94-D-0033 Delivery Order No. 0003

ENERGY EFFICIENCY STUDY (POWER DISTRIBUTION) FORT GREELY, ALASKA

1.0 General Information:

1.1 The Architect-Engineer (A-E) shall furnish all services, materials, supplies, labor, equipment, investigations, studies, supervision and travel as required in connection with this Statement of Work (SOW), and all furnished and referenced instructions.

1.1.1 This SOW is organized as follows:

Paragraph TOPIC:

- 1.0 General Information
- 2.0 Project Criteria
- 3.0 Cost and Scope Limitations
- 4.0 Delivery Schedule
- 5.0 Architect Engineer Services
- 6.0 Initiation Of Work
- 7.0 Government Review
- 8.0 Travel
- 9.0 Submittals

evaluate energy savings, construction costs, and the cost to savings ratio associated with converting the existing power distribution system from 2400 volts, 3-wire ungrounded Delta to a 4-wire system. The AE shall investigate the existing system, and prepare a comprehensive report documenting all work performed, the results and recommendations. See Annex D for list of buildings and linear feet of utilities to remain active after base realignment.

The investigation is to include but not limited to: Insulators, crossarm condition, pole condition, wire size, wire material, wire connectors and transformers. Begin at the output of the Golden Valley Electric Association Transformed into the power plant and out through the distribution system. There are approximately 35 miles of overhead distribution system. Single line drawings of the distribution system resulting from a recent short circuit study and feeder and transformer data are at Enclosure 1.

1.1.4 Point of Contact: The Design Manager for this project is Mr. Ron Cothren and the Contracting Officer's Representative is Mr. Claude Vining and the ACOR is Mrs. Trillis Enders. The Point of Contact at Fort Greely is Mr. Mike Murphy.

2.0 Project Criteria:

2.1 Government Furnished Materials and Equipment:

- a. US Army Corps of Engineers, Architectural and Engineering Instructions Design Criteria, 9 December 1991.
 - b. Energy Conservation Investment Program (ECIP) Guidance, dated 10 Jan 1994.
 - c. TM5-785, Engineer Weather Data
 - d. AR 420-49, Heating, Energy Selection and Fuel Storage, Distribution, and Dispensing Systems.
 - e. Tri-Service Military Construction Program (MCP) Index, dated 4 January 1994.
- f. MCACES-Gold cost estimating guidance, program and database, diskettes, and licensing agreement.
 - 2.2.1 Review Previous Studies: Previous EEAP studies do not cover power distribution.

3.0 Cost and Scope Limitations:

3.1 Cost Limitation: The construction cost limitation for this project is undefined. The AE will be responsible for developing the cost based upon the scope constraints for this project.

3.2 Cost Estimate:

- 3.1.2 Cost Estimate Format: Cost estimates shall be prepared using the latest version of Micro Computer Aided Cost Engineering System (MCACES)-GOLD, Version 5.20J or greater, with the appropriate labor equipment and material data bases. MCACES-GOLD will be provided to the A-E by the Cost Engineering Branch of the Alaska District Corps of Engineers at no cost. Upon completion of the contract, the A-E will return all material to the Government. The Alaska District is using a Standardized Work Breakdown Structure (WBS) for all military and civil work cost estimates. Corps format for cost estimates will be made available for use on other cost estimate requirements.
- 4.0 <u>Delivery Schedule</u>: The work, other related data, and services required in accordance with the contract shall be accomplished within the limitation of projects scope. The schedule for delivery of data to the Contracting Officer is in calendar days. Calendar days for each requirement extend from the date of the Notice to Proceed (NTP) or approval for each item, except as otherwise noted.

	<u>Item</u>	Schedule	<u>DeliveryReview/Conference</u> <u>Time/Location</u>
(a)	Start Project: Interviews and Site Survey	30 days following NTP	Not Required
(ь)	Interim Submittal	90 days following NTP	28 days / Post
(c)	Final Submittal	21 days following Interim Rev. Conf.	Not required

5.0 Architect-Engineer Services:

- 5.1 <u>Interim Submittal</u>: The interim submittal shall fulfill the requirements of the paragraph 7.6.1 of the General Scope of Work.
- 5.2 <u>Final Submittal</u>: The final submittal shall fulfill the requirements of paragraph of the General Scope of Work. The A-E shall incorporate all interim review conference comments. The Government may back-check all documents which comprise this submittal. The documents, if found incomplete, shall be returned to the A-E for further work which shall be performed at no additional cost to the Government.

6.0 Initiation of Work:

The AE shall not proceed nor initiate any work nor any succeeding design level of the work required under this SOW prior to receipt of award. Any work done without being directed to do so by the Contracting Officer/authorized representative shall be at the AE's own risk.

7.0 Government Review:

- 7.1 Value Engineering: Not Used.
- 7.2 Review: The Contracting Officer or his authorized representative may furnish the AE review comments on the data submitted. The AE shall incorporate all accepted review comments in the development of data for the next submittal. The AE will not be required to incorporate comments that may be categorized as "designer preference." If any review comment requires clarification and/or amplification to assure compliance, the AE shall notify the Contracting Officer or his authorized representative in writing.

8.0 Travel:

Out of town travel is anticipated to Fort Greely at Delta Junction, Alaska.

9.0 Submittals:

All submittals shall be received at the Alaska District Engineer Offices, Design Management Section, Military Technical Engineering Branch in accordance with the design schedule in Section 4.0 above.

- 9.1 A dated submittal letter shall be provided with each submittal to the Contracting Officer with distribution to agencies listed. This letter shall indicate to whom and the number of copies to be mailed to the agencies listed via overnight, hand, or telefax delivery service by the AE.
- 9.2 The A/E shall make direct distribution of correspondence, minutes, report submittals, and responses to comments as indicated by the following schedule:

AGENCY	EX	REP	OR1 ORI	E SUMMARIES S RESPONDENCE ELD NOTES
Commander, 6th Infantry Division (Light) ATTN: APVR-FG-PW (Murphy)				
P.O. Box 1289, Delta Junction, AK 99737	7	7	1	1*
Commander, 6th Infantry Division (Light)				
ATTN: APVR-PW-O (Berg) Building 730, Fort Richardson, AK 99505-5500	3	3	1	•
Building 750, Port Rectal about, 711.				
Commander, USAED, Mobile				
ATTN: CESAM-EN-DM (Battaglia)	_			
P.O. Box 2288, Mobile, AL 36628-0001	1	1	1	-
Commander, USAED, Alaska				
ATTN: CENPA-EN-TE-DM (Piening)				
P.O. Box 898, Anchorage, AK 99506-0898	7	7	7	1*
Commander, USAED, Alaska				
ATTN: CENPA-CO-FR (Shuman)			_	
P.O. Box 35066, Fort Wainwright, AK 99703-0066	1	1	1	-
Commander, North Pacific Division				
ATTN: CENPD-PE-TE (Pinkham)	_	_		
P.O. Box 2870, Portland, OR 97208-2870	1	1	•	-
Commander, US Army Logistics Evaluation Agency				•
ATTN: LOEA-PL (Mr. Keath)				
New Cumberland Army Depot				
New Cumberland, PA 17070-5007	1	-	-	-
Commander, US Army Corps of Engineers				
ATTN: CEMP-ET (Mr. Gentil)				•
20 Massachussetts Avenue, NW				
Washington, DC 20314-1000	1	-	-	-

* Field Notes Submitted in final form at interim submittal

4 Aug 94

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A - 4

ANNEX B

EXECUTIVE SUMMARY GUIDELINE

- 1. Introduction.
- 2. Building Data (types, number of similar buildings, sizes, etc.)
- 3. Present Energy Consumption of Buildings or Systems Studied.
 - Total Annual Energy Used.
 - Site Energy Consumption.

Electricity - KWH, Dollars, BTU
Fuel Oil - GALS, Dollars, BTU
Natural Gas - THERMS, Dollars, BTU
Propane - GALS, Dollars, BTU
Other - QTY, Dollars, BTU

- 4. Energy Conservation Analysis.
 - ECOs Investigated.
 - ECOs Recommended.
 - ECOs Rejected. (Provide economics or reasons).
 - ECIP Projects Developed. (Provide list)*
 - Non-ECIP Projects Developed. (Provide list)*
 - Operational or Policy Change Recommendations.
- * Include the following data from the life cycle cost analysis summary sheet: the cost (construction plus SIOH), the annual energy savings (type and amount), the annual dollar savings, the SIR, the simple payback period and the analysis date.
- 5. Energy and Cost Savings.
 - Total Potential Energy and Cost Savings resulting from recommended projects in MBTU/yr and \$K/yr.
 - Percentage of Energy Conserved
 - Energy Use and Cost Before and After the Energy Conservation Opportunities are Implemented.

ANNEX C

REQUIRED DD FORM 1391 DATA

To facilitate ECIP project approval, the following supplemental data shall be provided:

- a. In title block clearly identify projects as "ECIP."
- b. Complete description of each item of work to be accomplished including quantity, square footage, etc.
- c. A comprehensive list of buildings, zones, or areas including building numbers, square foot floor area, designated temporary or permanent, and usage (administration, patient treatment, etc.).
- d. List references, and assumption, and provide calculations to support dollar and energy savings, and indicate any added costs.
- (1) If a specific building, zone, or area is used for sample calculations, identify building, zone or area, category, orientation, square footage, floor area, window and wall area for each exposure.
 - (2) Identify weather data source.
 - (3) Identify infiltration assumptions before and after improvements.
- (4) Include source of expertise and demonstrate savings claimed. Identify any special or critical environmental conditions such as pressure relationships, exhaust or outside air quantities, temperatures, humidity, etc.
- e. Claims for boiler efficiency improvements must identify data to support present properly adjusted boiler operations and future expected efficiency. if full replacement of boilers is indicated, explain rejection of alternatives such as replace burners, nonfunctioning controls, etc. Assessment of the complete existing installation is required to make accurate determinations of required retrofit actions.
- f. AN ECIP life cycle cost analysis summary sheet as shown in the ECIP Guidance shall be provided for the complete project and for each discrete part included in the project. The SIR is applicable to all segments of the project. Supporting documentation consisting of basic engineering and economic calculations showing how savings were determined shall be included.
- g. The DD Form 1391 face sheet shall include, for the complete project, the annual dollar and MBTU savings, SIR, simple amortization period and a statement

attesting that all buildings and retrofit actions will be in active use throughout the amortization period.

- h. The calendar year in which the cost was calculated shall be clearly shown on the DD Form 1391.
- i. For each temporary building included in a project, separate documentation is required showing (1) a minimum 10-year continuing need, based on the installation's annual real property utilization survey, for active building retention after retrofit, (2) the specific retrofit action applicable and 93) an economic analysis supporting the specific retrofit.
- j. Nonappropriated funded facilities will not be included in an ECIP project without an accompanying statement certifying that utility costs are not reimbursable.
- k. Any requirements required by ECIp guidance dated 4 Nov 1992 and any revisions thereto. Note that unescalated costs/savings are to be used in the economic analyses.
- I. The five digit category number for all ECIP projects except for Family Housing is 80000. The category code number for Family Housing projects is 71100.

ANNEX D

DETAILED SCOPE OF WORK (REVISED) CONTRACT NO. DACA85-94-D-0033 Delivery Order No. 0003

ENERGY EFFICIENCY STUDY (STEAM, WATER, SANITARY SEWER) FORT GREELY, ALASKA

1.0 GENERAL INFORMATION

1.1 The Architect-Engineer (AE) shall furnish all services, materials, supplies, labor, equipment, investigations, studies, supervision and travel as required in connection with this Statement of Work (SOW), and all furnished and referenced instructions.

1.1.1 This SOW is organized as follows:

Paragraph TOPIC:

- 1.0 General Information
- 2.0 Project Criteria
- 3.0 Initiation Of Work
- 4.0 Government Review
- 5.0 Travel
- 6.0 Schedule and Submittal Requirements
- 7.0 Payment Schedule
- 1.1.2 <u>Project Description</u>: The purpose of the Energy Efficiency Study is to identify modifications necessary to provide the most energy efficient configuration of utilities to serve the designated active buildings at Fort Greely following implementation of the base realignment plan. Currently the buildings at Fort Greely are served by a central electric distribution system, central steam system, central potable water system, and a central sewer system. Much of these central systems are near the end of their useful lives. With the abandoning of most buildings, the existing utilities will likely be grossly over sized and operate with poor energy efficiency and high maintenance costs. This study is to evaluate the following configurations for each utility:
 - a. Modification of central systems to serve remaining designated active buildings.
 - Installation of separate utilities to serve each designated active building or group of buildings.

The contractor will be required to evaluate the central steam, potable water, and sanitary sewer systems and determine if the systems are adequate to serve the buildings and associated utilidors designated in the Fort Greely Realignment Plan (see Active Building List below) that are to remain active. In evaluating the present system, the contractor shall complete a energy survey and provide a plan that will provide the greatest energy efficiency.

There are currently 231 buildings located on Fort Greely, consisting of 1,699,787 sq. ft. of space. the majority of which will be "laid-away" under the Layaway Program for disposition or eventual demolition. Of these 231 buildings, the tollowing have been identified for retention to support the residual force to be left at Fort Greely. The following tables are from a draft of the IMPLEMENTATION PLAN FOR REALIGNMENT OF FORT GREELY as provided by Mr. Mike Murphy, Dept. of Public Works, Ft. Greely, Alaska:

Permanent Active Facility List as of 25 JUL 95

Bldg No.	Description	Location	Size (SF)
140.	Description	zocation	OLD (01)
110	POL Monitoring	North Post	382
5 01	HQ	Cantonment	19,095
5 04	Fire Station	Cantonment	6,192
60 5	Consolidated PW	Cantonment	24,915
60 6	Central Heat Plant	Cantonment	30,334
6 07	Heat Plant Annex	Cantonment	99 9
615	Roads and Grounds	Cantonment	17,351
617	POL Operation	Cantonment	44 8
618	POL Operation	Cantonment	621
63 3	Sewage Treatment	Cantonment	2,784
63 8	Sewage Lagoon	Cantonment	74 2
63 9	Contact Chamber	Cantonment	69 6
82 0	Unacc Pers Hsg	Cantonment	16,175
82 1	Unace Pers Hsg	Cantonment	16,175
5 03	Gym w/o Pool	Cantonment	22,43 0
725	State School	Cantonment	0 (Non-Army)
1928 & 1930	CRTA Complex	Bolio Lake	35,0 61
2013, 2019, 202 6	NWTC Complex	Black Rapids	39,2 18
1600, 1605, 1606	Range	Texas Range	6,211
1343, 1350, 1352	Range	Beales Range	4,9 68
1419	Range	Mississippi Range	9 60
		TOTAL	245,937

Real Property Utilities

Category	Before	After
Overhead Electric	31.2 Miles	23.1 Miles
Underground Electric	10.7 Miles	3.4 Miles
Steam/Condensate Lines	57,000 LF	5,700 LF
Water Lines	40,000 LF	5,700 LF
Sewer Lines	45,000 LF	7,700 LF
Utilidors	17,600 LF	5,550 LF

1.1.3 Points of Contact: The Design Manager for this project is Mr. Ron Cothren and the Contracting Officer's Representative is Mr. Claude Vining and the ACOR is Mrs. Trillis Enders. The Point of Contact at Fort Greely is Mr. Mike Murphy.

2.0 PROJECT CRITERIA

2.1 Government Furnished Materials and Equipment:

- a. US Army Corps of Engineers, Architectural and Engineering Instructions Design Criteria, 9 December 1991.
- b. Energy Conservation Investment Program (ECIP) Guidance, dated 10 Jan 1994.
- c. TM5-785, Engineer Weather Data
- d. AR 420-49, Heating, Energy Selection and Fuel Storage, Distribution, and Dispensing Systems.
- e. Tri-Service Military Construction Program (MCP) Index, dated 4 January 1994.
- f. MCACES-Gold cost estimating guidance, program and database, diskettes, and licensing agreement.

2.2 Field Investigation

Conduct a survey of the existing central utilities and the buildings to remain under the Fort Greely realignment plan. Data collected for each utility should include, but not be limited to the following:

- a. Present condition and expected life of the existing central distribution systems.
- b. Modifications necessary to restrict central utility service only to designated active building and facilities.
- c. Data necessary to determine costs associated with continued operation of central utility systems including modification costs, energy costs, and operating and maintenance (O & M) costs.
- d. Data necessary to determine utility capacity requirements and energy consumption of each designated active building.
- e. Modifications necessary to install separate utilities in individual buildings or groups of buildings.

2.3 Analysis

- a. Operation of existing central systems with only those essential modifications required to serve the remaining designated active buildings. This option will serve as the baseline for Energy Conservation Oportunity (ECO) analysis.
- b. ECO 1: Operation of existing central systems optimized to serve the remaining designated active buildings.
- c. ECO 2: Installation of separate utilities (where practical) to serve each designated active building or group of buildings.

The A/E should identify the logical configuration of each utility for each of the above options and perform life cycle cost analysis (LCCA) including capital costs of required modifications, energy costs, and O & M costs.

Economic analysis should follow the criteria for the "Energy Conservation Program (ECIP) Guidance", described in letter from DAIM-FDF-U, dated 10 Jan 1994.

Computer modeling will be used to determine the annual energy costs for typical buildings. The results of these calculations may be applied to buildings which are similar to the typical buildings. To be considered similar, a building must have the same type of occupancy schedule, the same type of HVAC system, and the same type of construction. Modeling will be performed using a professionally recognized and proven computer program of programs that integrate architectural features with air-conditioning, heating, lighting,, and other energy-producing or consuming systems. These programs will be capable of simulating the features, systems, and thermal loads of the building under study. The simulation programs acceptable for use in this study are listed below. Any substitutes must be submitted and approved by the COR.

- A. Building Loads and System Thermodynamics (BLAST).
- B. DOE 2.1d
- C. Carrier E20 of Hourly Analysis Program (HAP)
- D. Trane Air-Conditioning Economics (TRACE).
- E. Beacon

3.0 INITIATION OF WORK

The AE shall not proceed nor initiate any work nor any succeeding design level of the work required under this SOW prior to receipt of award. Any work done without being directed to do so by the Contracting Officer/authorized representative shall be at the AE's own risk.

4.0 GOVERNMENT REVIEW:

- 4.1 Value Engineering: Not Used.
- 4.2 <u>Review</u>: The Contracting Officer or his authorized representative may furnish the AE review comments on the data submitted. The AE shall incorporate all accepted review comments in the development of data for the next submittal. The AE will not be required to incorporate comments that may be categorized as "designer preference." If any review comment requires clarification and/or amplification to assure compliance, the AE shall notify the Contracting Officer or his authorized representative in writing.

5.0 TRAVEL

Out of town travel is anticipated to Fort Greely at Delta Junction, Alaska.

6.0 SCHEDULE AND SUBMITTAL REQUIREMENTS

Submittal

Schedule

Pre-Final Report

120 days from NTP

Review Conference

30 days after Pre-Final submittal

Final Report

30 days from review conference

- 6.1 A dated submittal letter shall be provided with each submittal to the Contracting Officer with distribution to agencies listed. This letter shall indicate to whom and the number of copies to be mailed to the agencies listed via overnight, hand, or telefax delivery service by the AE.
- 6.2 The A/E shall make direct distribution of correspondence, minutes, report submittals, and responses to comments as indicated by the following schedule:

AGENCY

EXECUTIVE SUMMARIES REPORTS CORRESPONDENCE ŒS

		•		ELD NOT	
Commander, 6th Infantry Division (Light) ATTN: APVR-FG-PW (Murphy) P.O. Box 1289, Delta Junction, AK 99737	7	7	I	1*	
Commander, 6th Infantry Division (Light) ATTN: APVR-PW-O (Berg) Building 730, Fort Richardson, AK 99505-5500	3	3	1	-	
Commander, USAED, Mobile ATTN: CESAM-EN-DM (Battaglia) P.O. Box 2288, Mobile, AL 36628-0001	1	1	1	•	
Commander, USAED, Alaska ATTN: CENPA-EN-TE-DM (Piening) P.O. Box 898, Anchorage, AK 99506-0898	7	7	7	I*	
Commander, USAED, Alaska ATTN: CENPA-CO-FR (Shuman) P.O. Box 35066, Fort Wainwright, AK 99703-0066	1	1	1	-	
Commander, North Pacific Division ATTN: CENPD-PE-TE (Pinkham) P.O. Box 2870, Portland, OR 97208-2870			1	1 -	-
Commander, US Army Logistics Evaluation Agency ATTN: LOEA-PL (Mr. Keath) New Cumberland Army Depot New Cumberland, PA 17070-5007	1	-	-	-	
Commander, US Army Corps of Engineers ATTN: CEMP-ET (Mr. Gentil) 20 Massachussetts Avenue, NW Washington, DC 20314-1000	1	-	-	-	
* Field Notes submitted in Final Form at interim submitta	1				
PIENING\re\x1600\ARMY\FTG058\ANNEXD.FTG	:	2 A u	g 95	i	

PIENING\re\x1600\ARMY\FTG058\ANNEXD.FTG



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CONFIRMATION NOTICE

Confirmation Notice No. 1

EMC #1406.003

DATE:

11 September 1995

PLACED TO:

Dennis Jones / Fred Jones

RECEIVED FM:

Dave Piening / Gary Creviston U.S. Army, COE, Alaska District

REPRESENTING: PHONE:

907/753-5609

PROJECT:

Energy Efficiency Study, Ft. Greely, AK

CONTRACT NO.: DACA01-94-D-0033, Delivery Order No. 003

NOTES

Fred Jones,

PREPARED BY:

E M C Engineers, Inc.

TIME & DATE

10:30 MST

OF TELECON:

11 September 1995

SUBJECT:

Clarifications to SOW dated 1 August 1995

The following is a summary of the items discussed, the comments made, and the decisions made during the telephone conversation.

- 1. EMC will submit a combined report that includes the Energy Efficiency Studies for the Power, Steam, Water, and Sanitary Sewer Distribution Systems.
- 2. EMC will proceed with the study using the list of buildings to remain active as provided in the SOW dated 1 August 1995. If this list is changed significantly before the completion of the report and the results of the study are impacted, a change in the SOW will be issued.
- EMC will use the distribution list from the original SOW dated 1 August 1994. Commander Pinkham will receive one copy of the report.
- 4. EMC will provide 23 copies each of the Pre-Final and Final reports.
- 5. EMC will address the fact that the base will not begin downsizing until 1997 and the downsizing will continue through 2000. The interim period between 1995 and 1997 will be discussed in the power distribution section of the study.

Confirmation Notice No. 1 11 September 1995 Page 2 of 2

- 6. EMC will include the cost of having GVEA provide electric service to the buildings that will remain after the downsizing.
- 7. The submittal schedule will be the same as shown in Section 6.0, Page D-4 of the SOW dated 1 August 1995. For the sake of clarity, that schedule is as follows:

<u>Submittal</u>	<u>Schedule</u>
Pre-Final Report	120 days from NTP
Review Conference	30 days after Pre-Final Submittal
Final Report	30 days from review conference

/oic

Action Required: Issue Notice to Proceed.

cc: Dennis Jones File

If any portion of this Confirmation Notice is incorrect, please notify us immediately. If correspondence is not received to the contrary within 14 days, it will be assumed that the decisions, conclusions, and status outlined in this Confirmation Notice are correct.



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CONFIRMATION NOTICE

Confirmation Notice No. 2

EMC #1406.003

DATE:

12 September 1995

PLACED TO:

Dennis Jones

RECEIVED FM:

Dave Piening

REPRESENTING:

U.S. Army, COE, Alaska District

PHONE:

907/753-5609

PROJECT:

Energy Efficiency Study, Ft. Greely, AK

CONTRACT NO.: DACA01-94-D-0033, Delivery Order No. 003

NOTES

Fred Jones,

PREPARED BY:

EMC Engineers, Inc.

TIME & DATE

16:45 MST

OF TELECON:

12 September 1995

SUBJECT:

Clarifications to Confirmation Notice No. 1

The following is a summary of the items discussed, the comments made, and the decisions made during the telephone conversation.

 EMC will submit two separate reports for the Energy Efficiency Study for Fort Greely Alaska. One report will be entitled "Energy Efficiency Study (Power Distribution), Fort Greely, Alaska. The other report will be entitled "Energy Efficiency Study (Steam, Water, Sanitary Sewer), Fort Greely, Alaska.

/oic

Action Required: Issue Notice to Proceed.

cc: Dennis Jones Bill Center

File

If any portion of this Confirmation Notice is incorrect, please notify us immediately. If correspondence is not received to the contrary within 14 days, it will be assumed that the decisions, conclusions, and status outlined in this Confirmation Notice are correct.



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CONFIRMATION NOTICE

Confirmation Notice No. 3

EMC #1406.003

DATE:

8 December 1995

PLACED TO:

Dave Piening

RECEIVED FM:

Fred Jones

REPRESENTING:

U.S. Army, COE, Alaska District

PHONE:

907/753-5609

PROJECT:

Energy Efficiency Study, Ft. Greely, AK

CONTRACT NO.:

DACA01-94-D-0033, Delivery Order No. 003

NOTES

Fred Jones,

PREPARED BY:

EMC Engineers, Inc.

TIME & DATE

Approximately 11:00 MST

OF TELECON:

6 December 1995

SUBJECT:

GVEA Letter

The following is a summary of the items discussed, the comments made, and the decisions made during the telephone conversation.

- The letter to GVEA prepared by EMC for the purpose of ascertaining their interest in supplying electricity directly to the remaining buildings at Fort Greely after the realignment, has been forwarded to the appropriate contracts people for disposition. It is likely that an answer on this issue will not be back before the power distribution report submittal is due. If that is the case, the issue will be mentioned in the report only to the extent that it is another avenue that is being investigated.
- 2. It has not been determined yet whether the review meeting will be held in Delta Junction or Anchorage. Will confirm later.

/oic

Action Required: Issue Notice to Proceed.

cc: Fred Jones
Dennis Jones

Confirmation Notice No. 3 8 December 1995 Page 2 of 2

> Doug Gray File

If any portion of this Confirmation Notice is incorrect, please notify us immediately. If correspondence is not received to the contrary within 14 days, it will be assumed that the decisions, conclusions, and status outlined in this Confirmation Notice are correct.



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CONFIRMATION NOTICE

Confirmation Notice No. 4

EMC #1406-003

DATE:

18 March 1996

PROJECT:

Energy Efficiency Study Steam., Water and Sewer Systems

CONTRACT NO.: DACA01-94-D-0033, Delivery Order No. 003

NOTES

Dennis Jones

PREPARED BY:

EMC Engineers, Inc.

DATE OF

MEETING:

February 23, 1996

PLACE OF

MEETING:

U.S. Army Corps of Engineers, Alaska District

Anchorage, Alaska

SUBJECT:

Preliminary Report Review Meeting, U.S. Army Corps of Engineers

Alaska District, Anchorage, Alaska

ATTENDEES:

Dave Piening, COE Anchorage, AK Paul Knoff, COE Anchorage, AK Mike Murphy, Ft. Greely, AK George Pursey, Fort Greely, AK Fred Jones, EMC Denver, CO Dennis Jones, EMC Denver, CO

The following is a summary of the items discussed, the comments made, and the decisions made during the meeting.

REVIEW COMMENTS

Robert S. Woodruff

1. COMMENT: General; Although the study is based around energy savings the fact that the fire protection water supply is being turned off along with the fact that unheated buildings deteriorate in just two years would seem more important that the energy savings involved. This should be emphasized in the final report. RESPONSE: The Executive Summary and Section 7 will be modified to emphasize these facts.

Confirmation Notice No. 4 U.S. Army Corps of Engineers Alaska District Review Comments 18 March 1996 Page 2 of 5

- 2. COMMENT: Page 2-4; The method used to calculate the amount of energy used for domestic hot water assumes that there is no heating load in July. Is this true? RESPONSE: No, July heating loads for the Fort were extrapolated from computer simulations at the school. The text on page 2-4 will be modified to explain more clearly.
- 3. **COMMENT**: Excellent study and report. The material was presented in a logical and understandable manner. **RESPONSE**: Thank You.

Mike Murphy

- COMMENT: Executive Summary Recommendations; The method of water circulation
 of freeze protection is likely to fail due to frozen water pipes.
 RESPONSE: The more reliable alternative of water circulation with water heating and
 pipe insulation will be recommended.
- COMMENT: Report 1.1 Authority for Study; Is the third sentence a correct portrayal
 of events or does it need to be re-phrased?
 RESPONSE: This paragraph will be rephrased to correctly identify the authority for
 the study.
- 3. COMMENT: Report 1.3 Scope of Work-Table 1-1; Gym with pool is 27430 s.f.; 725 (school) is 54,604 s.f. Add 612-Tank Maintenance-Containment-s.f. 18681, Add 658-Temp. Motor Pool-Containment-s.f. 25,425, Add 625-Pump House-Containment-s.f. 293 Note: 612, 658, 625 are served by central utilities. The total square footage served by central utilities is the relevant number for this study. RESPONSE: Building areas will be corrected as indicated.
- 4. **COMMENT**: Report 2.1.1 Description/Central South Heating System; Two of the original three 1954 Boilers were replaced in 1993. One original boiler remains in service system operates at 120 PSIG RESPONSE: Paragraph will be corrected.
- COMMENT: Report 2.1 Figure 2-1 Utlidor System; Add Bldgs. 612, 658, & 625 as "Active Buildings" RESPONSE: Figure will be corrected.
- COMMENT: Report 2.1.3 Energy Consumption/Space Heating: If current space heating requirements is used in this simulation, the school floor area should be corrected for 50,228 to 54,604 s.f. (8% difference).
 RESPONSE: School floor area will be corrected.

Confirmation Notice No. 4 U.S. Army Corps of Engineers Alaska District Review Comments 18 March 1996 Page 3 of 5

7. **COMMENT**: Report 2.2.1 Description/Central Water System-second paragraph; One other well for supplementing water supply-not four, well depth vary from 270' to 400'. Water table 200'+.

RESPONSE: Paragraph will be corrected.

8. **COMMENT:** Report 2.3.1 Description/Central Sewer System-Third paragraph; A) The disinfecting chamber and the chlorinating facility are the same. B) The two effluent pumps run 3 to 4 hours/day each. **RESPONSE:** Section will be corrected.

9. **COMMENT:** Report 2.3.2 Energy Consumption; No stirrers in the system. **RESPONSE:** Stirrers will be dropped from text.

- 10. **COMMENT**: Report 3.4 Table 3-3: Total water cost all three options is \$47,155. **RESPONSE**: Domestic water use and cost would remain constant because there is no one in the abandoned buildings to use water whether they are heated or not.
- 11. COMMENT: Report 4.1.1 Distribution Heating Systems-description; Change the two boilers each sized at 60% of peak demand at each building to two boilers each sized at 100% of peak demand. This changes the required boiler capacity listed in Table 4-1. (Capacity looks low even for 60%)

 RESPONSE: Text and cost estimate will be modified to reflect boilers sized at 100%.
- 12. COMMENT: Report 4.2.1 Distributed Water Systems-Description; Wells drilled to 250 feet will work; water table is at 180' to 200'+ RESPONSE: Text and cost estimate will be modified.
- 13. COMMENT: Report 4.6 Implementation Costs-Table 4-4; A) Cost Shown for distributed steam boilers' is too low-per Appendix F, the \$376,039 is total of boilers in seven buildings, (or is it two?) one each and assumed to be sized at 60% of peak demand. Need two boilers each sized at 100% at each building. Add boilers for 612 & 658. Also 501. B) Cost shown for "Boiler Fuel Systems" is too low-installed cost for 5000 gal. UST at Ft. Greely is \$40,000. Installed cost for 1000 gal. UST at Ft. Greely is \$21,000. Ft. Greely DPW would probably install 5000 gallon UST at most buildings, maybe two at 725 (school).

RESPONSE: See Comment 11 above. Suggested costs for fuel tanks will be used. Fuel tank sizes will be re-evaluated.

Confirmation Notice No. 4 U.S. Army Corps of Engineers Alaska District Review Comments 18 March 1996 Page 4 of 5

14. COMMENT: Report 4.1.1 Distributed Heating Systems-Description; The Annual Energy Cost for Fuel Oil in Table 4-1 is Based on \$0.73/gallon. That's what we pay when we purchase 2 million gallons per year. Expect a price increase (say 20%) if, after brac. we purchase 200,000 gallons per year.

RESPONSE: Fuel prices for distributed options will be increased by 20%.

15. **COMMENT**: Report 5.1 Mixed Utility Systems-General; Any scenario that considers retaining portions of existing central utilities has to factor in the costs associated with working in utilidors containing asbestos pipe installation. **RESPONSE**: Cost of working in an asbestos environment for pipe insulation and

distributed boiler connection will be added to the cost estimate.

16. **COMMENT:** Report 5.3 Mixed Utility Systems-General/Freeze Protection Options; The study concludes that the water system should remain centralized based on the economics presented in Table 5-1. The study then presents freeze protection methods and chooses combinations of circulation flow to drain, utilizing the existing system. The plan is the assumption of 100% reliability of the circulation. The only viable option to consider involves heating the water, insulating the pipes, then circulate to drain. Even with this option, flow must be maintained.

RESPONSE: The report will be modified to use the option recommended above which is the most reliable.

17. COMMENT: Report 5.2 Freeze Protection of Central Water Systems; Verify (identify the studies) that water flowing in a pipe will not form ice above a water temperature of 22-24°F I believe this is a standing matter case, not flowing water, and lasts only a short period of time.

RESPONSE: The source of this analysis will be referenced.

18. COMMENT: Report 6.2 LCCA Results; The option with the least life cycle cost will probably change. The option presented does not include costs of thawing lines and repairing pipes due to failure of circulation flow.

RESPONSE: See comment 16 above. It was agreed that the cost of the various and

RESPONSE: See comment 16 above. It was agreed that the cost of thawing and repairing pipe should not be included for the new recommended option.

19. COMMENT: Report 6.2 LCCA Results-Table 6-1; The investment costs shown for "Distributed Steam Boilers" "Boiler Fuel Systems" and "Water Pipe Insulation" appear to be too low.

RESPONSE: We will modify cost estimate as per comments 11, 12, 13, and 15.

Confirmation Notice No. 4 U.S. Army Corps of Engineers Alaska District Review Comments 18 March 1996 Page 5 of 5

20. COMMENT: Report 7.2 Recommendations; The recommended option is not acceptable unless 100% reliability of circulation flow is assured.
RESPONSE: This recommendation will be changed. See comment 16.

VERBAL COMMENTS

- 1. A distributed boiler will also be required to heat Building 606, the power plant, where the water system is located.
- 2. The utility staff recommended should be raised form 2 to 4 people.
- 3. The burdened labor rate should be \$35.00 per hour.
- 4. The statement regarding building deterioration should be removed. This deterioration process is currently not understood and is being studied.

 $v: \verb|\1406.003\admin\verb|\ot-crspd\verb|\conf4.doc|$

This meeting was adjourned.

DJ:nj

Action Required:

cc:

If any portion of this Confirmation Notice is incorrect, please notify us immediately. If correspondence is not received to the contrary within 14 days, it will be assumed that the decisions, conclusions, and status outlined in this Confirmation Notice are correct.

APPENDIX B STEAM SYSTEM ANALYSIS

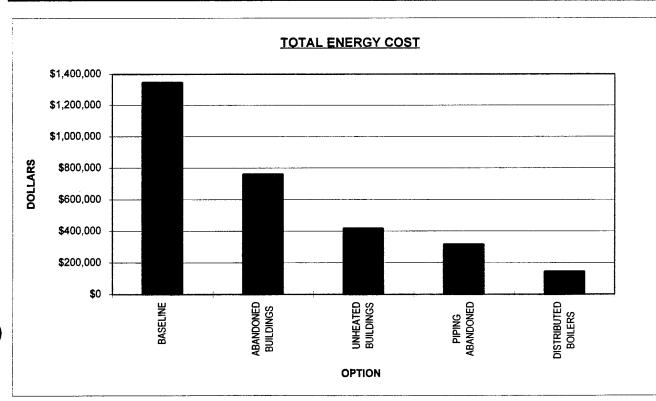
EMC Engineers, Inc 2750 S Wadsworth Blvd Denver, Co 80227

	BASELINE	ABANDONED BUILDINGS	UNHEATED BUILDINGS	PIPING ABANDONED	DISTRIBUTED BOILERS
	Baseline central utilities: All buildings in use, heated to 70F		buildings unheated	buildings unheated and	Distributed boilers: abandoned buildings unheated
Area of active buildings (SF)	1,256,172 sf	257,376 sf	257,376 sf	257,376 sf	257,376 sf
Area of abandoned buildings (SF)	0 sf	998,796 sf	998,796 sf	99 8,796 sf	998,796 sf
Total Area (SF)	1,256,172 sf	1,256,172 sf	1,256,172 sf	1,256,172 st	1,256,172 st

Heat loss from active buildings (mbtu)	122,170 mbtu	23,407 mbtu	23,407 mbtu	23,407 mbtu	15,693 m btu
Heat loss from abandoned buildings (mbtu)		45,432 mbtu			
Steam for Heating (mbtu)	122,170 mbtu	68,839 mbtu	23,407 mbtu	23,407 mbtu	15,693 mbtu
Steam for domestic water heating (mbtu)	26,486 mbtu	5,427 mbtu	5,427 mbtu	5,427 mbtu	3,638 mbtu
Steam for deaerator (mbtu)	19,085 mbtu	9,737 mbtu	5,194 mbtu	3,842 mbtu	0 mbtu
Steam pipe loss (mbtu)	23,109 mbtu	23,109 mbtu	23,109 mbtu	9,589 mbtu	0 mbtu
Total Steam Production (mbtu)	190,850 mbtu	107,112 mbtu	57,137 mbtu	42,2 65 mbtu	19,332 mbtu

Boiler fuel oil usage (gal)	1,791,484 gal	1,005,444 gal	536,336 gal	396,735 gal	181,466 gal
Boiler electrical usage (kwh)	466,502 kwh	344,794 kwh	332,179 kwh	332,179 kwh	159,362 kwh

Annual fuel oil cost	\$1,307,783	\$ 733,974	\$391,525	\$289,617	\$132,470
Annual electrical cost	\$39,576	\$27,467	\$26,462	\$26,462	\$12,695
Total annual energy cost	\$1,347,360	\$761,441	\$417,987	\$316,079	\$145,165



BUILDING	BUILDING	
NUMBER	DESCRIPTION	SQFT
501	POST HQ	19,095
503	GYMNASIUM	27,430
504	FIRE STATION	6,192
605	CONSOLIDATED PW	24,915
606	CENTRAL HEATING PLAN	31,333
612	TANK MAINTENANCE	18,681
615	ROADS AND GROUNDS	17,351
658	TEMP MOTOR POOL	25,425
725	SCHOOL	54,604
820	HOUSING UNIT	16,175
821	HOUSING UNIT	16,175
	TOTAL: REMAINING	257,376 sf
	BUILDINGS	201,310 31
	TOTAL: EXISTING AREA FROM 'Steam Pipe Study'	1,256,172 sf

FUEL OIL COST (BASELINE)

#1406.003 Ft. Greely Utility Study 3/15/96 JvS

55 psig

907.8 btu/lb

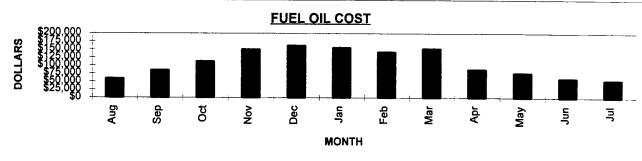
0.73 \$/gai

Area of Ft. Greely school: 54,604 SF Steam pressure: Area of Ft. Greely served by steam plant (baseline): 1,256,172 SF Latent heat of evaporation: Area of Ft. Greely active buildings served by steam plant: 257,376 SF Fuel oil cost: Area of Ft. Greely abandoned buildings served by steam plant: 998,796 SF Electrical rate charge: 0.0711 \$/kwh Electrical demand charge:

Electrical demand charge:	6.25	\$/kwh
Manpower cost:	40	\$/hr
 		

	STEAM FOR HEATING [FROM METERED FUEL OIL USAGE]												
MONTH	OIL USAGE	ELEC GEN	BOILER	STEAM	STEAM FOR	STEAM FOR	STEAM	STEAM FOR	FUEL OIL				
]	USAGE	FUEL OIL	PRODUCTION	DOM. WATER	DEAERATOR	PIPE LOSS	HEATING	COST				
Aug '94 to	(corrected)		USAGE										
Jul '95	(gal)	(gal)	(gal)	(mbtu at 100psi)	(mtbu)	(mbtu)	(mbtu)	(mbtu)	(\$)				
Aug	83,045	-722	82,323	8,770	-2,207	-877	-1,926	3,760	60,096				
Sep	119,527	-1,313	118,214	12,594	-2,207	-1,259	-1,926	7,201	86,296				
Oct	157,732	-2,346	155,386	16,554	-2,207	-1,655	-1,926	10,765	113,432				
Nov	214,447	-8,147	206,300	21,978	-2,207	-2,198	-1,926	15,647	150,599				
Dec	239,799	-16,701	223,098	23,767	-2,207	-2,377	-1,926	17,257	162,862				
Jan	230,947	-17,054	213,893	22,786	-2,207	-2,279	-1,926	16,375	156,142				
Feb	208,500	-12,999	195,501	20,827	-2,207	-2,083	-1,926	14,611	142,716				
Mar	216,410	-6,175	210,235	22,397	-2,207	-2,240	-1,926	16,024	153,472				
Apr	123,238	-1,682	121,556	12,950	-2,207	-1,295	-1,926	7,522	88,736				
Мау	107,588	-1,519	106,069	11,300	-2,207	-1,130	-1,926	6,037	77,430				
Jun	84,352	-951	83,401	8,885	-2,207	-888	-1,926	3,863	60,883				
Jul	76,730	-1,222	75,508	8,044	-2,207	-804	-1,926	3,107	55,121				
TOTALS	1,862,315	-70,831	1,791,484	190,850	-26,486	-19,085	-23,109	122,170	\$1,307,783				

CALCULATE STEAM FOR HEATING		CALCULATE STEAM PIPE LOSS
OIL USAGE (corrected) (gal) (Data from Ft. Greely)		-23,109 mbtu (pipe loss per year from 'Steam Dist. Study')
subtract (-) ELEC GEN USAGE (gal) (Data from Ft. Greely)	divide (/)	12 months per year
equal (=) BOILER FUEL OIL USAGE (gal)	equai (=)	-1,926 mbtu (STEAM PIPE LOSS)
multiply (x) 134,510 btu/gal (High Heat Value)	CALC	ULATE STEAM FOR DOMESTIC WATER PER MONTH
multiply (x) .792 (boiler efficiency)		8,044 mbtu (STEAM PRODUCTION in July)
divide (/) 1,000,000 btu/mbtu	subtract (-)	3,107 mbtu (STEAM FOR HEATING (calculated) in July)
equal (=) STEAM PRODUCTION (mbtu)	subtract (-)	804 mbtu (STEAM FOR DEAERATOR in July)
subtract (-) STEAM FOR DOM. WATER (mbtu) (Calculated this sheet)	subtract (-)	1,926 mbtu (STEAM PIPE LOSS in July)
subtract (-) STEAM FOR DEAERATOR (mbtu) (Calculated this sheet)	equal (=)	2,207 mbtu (STEAM FOR DOM, WATER per month)
subtract (-) STEAM PIPE LOSS (mbtu)		CALCULATE HEAT LOSS PER SQUARE FOOT
equal (=) STEAM FOR HEATING (mbtu)		4,966 mbtu (HEATING (SCHOOL) per year)
	divide	54,604 SF (area of school)
CALCULATE FUEL OIL COST	equal (=)	0.091 mbtu/SF
BOILER FUEL OIL USAGE (gal)		CALCULATE STEAM FOR DEAERATOR
multiply (x) 0.73 FUEL OIL PRICE (\$/gal)	S1	FEAM PRODUCTION (mbtu)
equal (=) FUEL OIL COST (\$)	multiply (x)	10%
	equal (=) ST	FEAM FOR DEAERATOR (mbtu)



TOTALS

FUEL OIL COST (ABANDONED BUILDINGS HEATED TO 45F)

#1406.003 Ft. Greely Utility Study 3/15/96 JvS

1,005,444

107,112

\$733,974

Area of Ft. Greely school:

54,604 SF

Area of Ft. Greely served by steam plant (baseline):

1,256,172 SF

Area of Ft. Greely active buildings served by steam plant:

2,483.75

equal (=) FUEL OIL COST (\$)

45,432

23,407

257,376 SF 998,796 SF

9,737

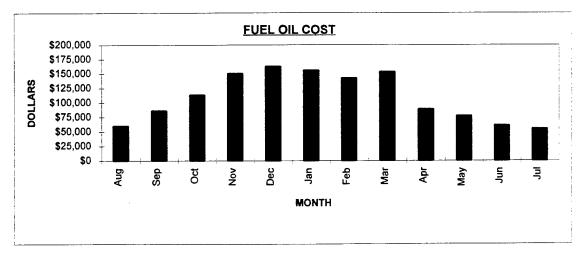
23,109

Area of Ft. Greely abandoned buildings served by steam plant:

	STEAM PRODUCTION [CALCULATED]													
MONTH	HEATING	HEATING	HEATING	STEAM	STEAM	STEAM	STEAM	BOILER	FUEL OIL					
Aug '94 to	(SCHOOL45F)	(ABANDONED)	(ACTIVE)	FOR DOM.	FOR	PIPE	PRODUCTION	FUEL OIL	COST					
Jul '95				WATER	DEAERATOR	LOSS		USAGE						
	(mbtu)	(mbtu)	(mbtu)	(mtbu)	(mbtu)	(mbtu)	(mbtu)	(gal)	(\$)					
Aug	3.40	62	6 69	452	311	1,926	3,420	32,101	23,433					
Sep	30.31	554	1,018	4 52	395	1,926	4,345	40,786	29,774					
Oct	157.46	2,880	1,855	452	711	1,926	7,824	73,444	53,614					
Nov	319.66	5,847	2,659	452	1,088	1,926	11,973	112,387	82,042					
Dec	470.00	8,597	3,419	452	1,439	1,926	15,834	148,629	108,499					
Jan	501.70	9,177	3,638	452	1,519	1,926	16,712	156,870	114,515					
Feb	398.05	7,281	2,982	452	1,264	1,926	13,905	130,523	95,282					
Mar	340.07	6,220	2,726	452	1,132	1,926	12,456	116,926	8 5,356					
Apr	191.74	3,507	1,910	452	779	1,926	8,574	80,487	58,755					
May	57.70	1,056	1,139	452	457	1,926	5,030	47,214	34,466					
Jun	11.23	205	757	452	334	1,926	3,674	34,492	25,179					
Jul	2.44	45	637	452	306	1,926	3,365	31,587	23,059					

5,427

CALCULATE STEAM FOR DOMESTIC WATER CALCULATE BOILER FUEL OIL USAGE HEATING (SCHOOL 45F) (mbtu) (Calculated) STEAM FOR DOM. WATER [complex] (mbtu) divide (/) Area of school (SF) divide (/) Area of school (SF) multiply (x) Area of modified (SF) multiply (x) Area of abandoned (SF) equal (=) HEATING (ABANDONED) (mbtu) equal (=) STEAM FOR DOM. WATER [modified] (mbtu) add (+) HEATING (MODIFIED) (mbtu) CALCULATE STEAM PIPE LOSS -23,109 mbtu (pipe loss per year from 'Steam Dist. Study') add (+) STEAM FOR DOM. WATER (mbtu) 12 months per year add (+) STEAM FOR DEAERATOR (mbtu) divide (/) -1,926 mbtu (STEAM PIPE LOSS) equal (=) add (+) STEAM PIPE LOSS (mbtu) CALCULATE STEAM FOR DEAERATTOR equal (=) STEAM PRODUCTION (mbtu) HEATING (ABANDONED) (mbtu) multiply (x) 1,000,000 btu/mbtu add (+) HEATING (MODIFIED) (mbtu) divide (/) 134,510 btu/gal (High Heat Value) add (+) STEAM FOR DOM. WATER (mbtu) divide (/) .792 (boiler efficiency) add (+) STEAM PIPE LOSS (mbtu) equal (=) BOILER FUEL OIL USAGE (gal) equal (=) Steam usage (mbtu) CALCULATE FUEL OIL COST multiply (x) 10%, Industry standard equal (=) STEAM FOR DEAERATOR (mbtu) BOILER FUEL OIL USAGE (gal) 0.73 FUEL OIL PRICE (\$/gal)



FUEL OIL COST (ABANDONED BUILDINGS UNHEATED)

#1406.003 Ft. Greely Utility Study 3/15/96 JvS

54,604 SF Area of Ft. Greely school: 1,256,172 SF Area of Ft. Greely served by steam plant (baseline): 257,376 SF Area of Ft. Greely active buildings served by steam plant:

Area of Ft. G	reely abandoned	buildings served	by steam plan	t:	998,796	SF		 	
			STEAM PR	ODUCTION [CAL	CULATED]				ļ
MONTH	HEATING	HEATING	STEAM	STEAM	STEAM	STEAM	BOILER	FUEL OIL	
Aug '94 to	(SCHOOL)	(ACTIVE)	FOR DOM.	FOR	PIPE	PRODUCTION	FUEL OIL	COST	
Jul '95	`		WATER	DEAERATOR	LOSS		USAGE		-
•••	(mbtu)	(mbtu)	(mtbu)	(mbtu)	(mbtu)	(mbtu)	(gal)	(\$)	<u> </u>
Aug	141.88	669	452	305	1,926	3,351	31,459	22,965	L
Sep	215.90	1,018	452	340	1,926	3,735	35,061	25,595	
Oct	393.50	1,855	452	423	1,926	4,656	43,705	31,905	L
Nov	564.18	2,659	452	504	1,926	5,541	52,012	37,969	L
Dec	725.41	3,419	452	580	1,926	6,377	59,859	43,697	
Jan	771.73	3,638	452	602	1,926	6,617	62,114	45,343	
Feb	632.60	2,982	452	536	1,926	5,896	55,342	40,400	
Mar	578.26	2,726	452	510	1,926	5,614	52,698	38,469	
Apr	405.14	1,910	452	429	1,926	4,716	44,272	32,318	l L
May	241.65	1,139	452	352	1,926	3,869	36,315	26,510	
Jun	160.63	757	452	314	1,926	3,449	32,372	23,631	
Jul	135.04	637	452	301	1,926	3,316	31,126	22,722	
TOTALS	4,966	23,407	5,427	5,194	23,109				
	CALCULAT	E BOILER FUE	L OIL USAGE	<u> </u>		CAL	CULATE STE	AM FOR DON	MESTIC WATER

STEAM FOR HEATING (COMPLEX)								
[CALCULATED]								
HEATING HEATING								
(SCHOOL)	(COMPLEX)							
(mbtu)	(mbtu)							
141.88	3,264							
215.90	4,967							
393.50	9,052							
564.18	12,979							
725.41	16,688							
771.73	17,754							
632.60	14,553							
578.26	13,303							
405.14	9,320							
241.65	5,559							
160.63	3,695							
135.04	3,107							
4,966	114,242							

CALCULATE BOILER FUEL OIL USAGE HEATING (SCHOOL) (mbtu) [Calculated] divide (/) Area of school (SF) multiply (x) Area of modified (SF)

equal (=) HEATING (MODIFIED) (mbtu) add (+) STEAM FOR DOM. WATER (mbtu) add (+) STEAM FOR DEAERATOR (mbtu)

add (+) STEAM PIPE LOSS (mbtu) equal (=) STEAM PRODUCTION (mbtu) multiply (x) 1,000,000 btu/mbtu

divide (/) 134,510 btu/gal (High Heat Value) divide (/) .792 (boiler efficiency)

equal (=) BOILER FUEL OIL USAGE (gal) CALCULATE FUEL OIL COST

BOILER FUEL OIL USAGE (gal) 0.73 FUEL OIL PRICE (\$/gal) multiply (x)

equal (=) FUEL OIL COST (\$)

CALCULATE STEAM PIPE LOSS -23,109 mbtu (pipe loss per year)

divide (/) 12 months per year

-1,926 mbtu (STEAM PIPE LOSS) equal (=)

STEAM FOR DOM. WATER (complex) (mbtu)

divide (/) Area of complex (SF) multiply (x) Area of modified (SF)

equal (=) STEAM FOR DOM. WATER (modified) (mbtu)

CALCULATE STEAM FOR HEATING (COMPLEX)

HEATING (SCHOOL) (mbtu) (Calculated)

divide (/) Area of school (SF) multiply (x) Area of complex (SF)

equal (=) HEATING (COMPLEX) (mbtu)

CALCULATE MEASURED TO CALCULATED RATIO

122,170 STEAM FOR HEATING (complex) (mbtu) [Measured]

114,242 HEATING (COMPLEX) (mbtu) [Calculated] divide (/)

1.07 Ratio of calculated steam for heating to measured CALCULATE STEAM USED FOR DEAERATOR

HEATING (MODIFIED) (mbtu)

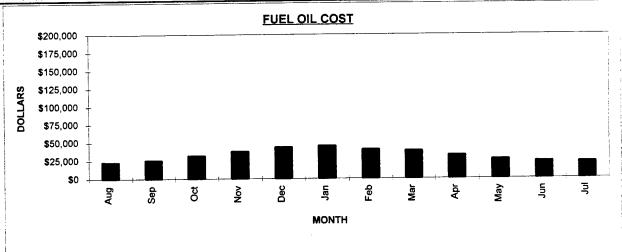
add (+) STEAM FOR DOM. WATER (mbtu)

add (+) STEAM PIPE LOSS (mbtu)

equal (=) Steam usage (mbtu)

multiply (x) 10%, Industry standard

equal (=) STEAM FOR DEAERATOR (mbtu)



FUEL OIL COST (ABANDONED BUILDINGS UNHEATED, SELECTED STEAM PIPING ABANDONED)

#1406.003 Ft. Greely Utility Study 3/15/96 JvS

Area of Ft. Greely school:

54,604 SF

Area of Ft. Greely served by steam plant (baseline):

1,256,172 SF

Area of Ft. Greely active buildings served by steam plant:

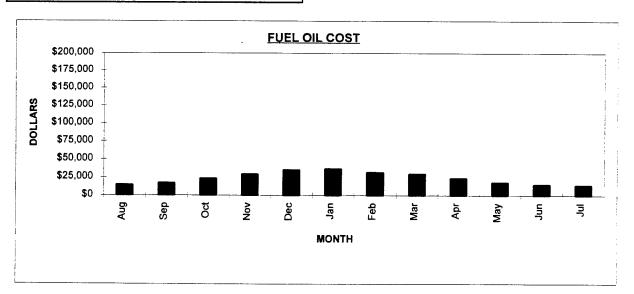
257,376 SF

Area of Ft. Greely abandoned buildings served by steam plant:

998,796 SF

	STEAM PRODUCTION [CALCULATED]													
MONTH	HEATING	HEATING	STEAM	STEAM	STEAM	STEAM	BOILER	FUEL OIL						
Aug '94 to	(SCHOOL)	(ACTIVE)	FOR DOM.	FOR	PIPE	PRODUCTION	FUEL OIL	COST						
Jul '95	1		WATER	DEAERATOR	LOSS		USAGE							
	(mbtu)	(mbtu)	(mtbu)	(mbtu)	(mbtu)	(mbtu)	(gal)	(\$)						
August	141.88	669	452	192	799	2,112	19,826	14,473						
September	215.90	1,018	4 52	227	799	2,496	23,428	17,103						
October	39 3.50	1,855	452	311	799	3,417	32,072	23,412						
November	564.18	2,659	452	391	799	4,302	40,379	29,477						
December	725.41	3,419	452	467	799	5,138	48,226	35,205						
January	771.73	3,638	452	489	799	5,378	50,480	36,851						
February	632.60	2,982	452	423	79 9	4,656	43,709	31,908						
March	578.26	2,726	452	398	799	4,375	41,064	29,977						
April	405.14	1,910	452	316	799	3,477	32,638	23,826						
May	241.65	1,139	452	239	799	2,629	24,682	18,018						
June	160.63	757	452	201	799	2,209	20,738	15,139						
July	135.04	637	452	189	799	2,077	19,493	14,230						
TOTALS	4,966	23,407	5,427	3,842	9,589	42,265	396,735	\$289,617						

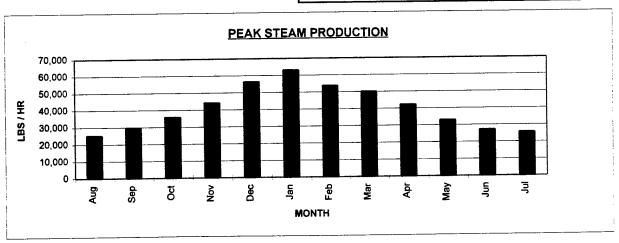
CALCULATE BOILER FUEL OIL USAGE	•	CALCULATE STEAM FOR DOMESTIC WATER
HEATING (SCHOOL) (mbtu) [Calculated]		STEAM FOR DOM: WATER [COMPLEX] (mbtu)
divide (/) Area of school (SF)		divide (/) AREA OF COMPLEX (SF)
multiply (x) Area of modified (SF)		multiply (x) AREA OF MODIFIED (SF)
equal (=) HEATING (MODIFIED) (mbtu)		equal (=) STEAM FOR DOM. WATER [MODIFIED] (mbtu)
add (+) STEAM FOR DOM. WATER (mbtu)		CALCULATE PIPE HEAT LOSS (PIPING CUT)
add (+) STEAM FOR DEAERATOR (mbtu)		-9,589 mbtu (pipe loss per year) [Calculated]
add (+) STEAM PIPE LOSS (mbtu)	divide	12 months per year
equal (=) STEAM PRODUCTION (mbtu)	=	-799 mbtu (STEAM PIPE LOSS)
multiply (x) 1,000,000 btu/mbtu		CALCULATE STEAM USED FOR DEAERATOR
divide (/) 134,510 btu/gal (High Heat Value)		HEATING (MODIFIED) (mbtu)
divide (/) .792 (boiler efficiency)		add (+) STEAM FOR DOM. WATER (mbtu)
equal (=) BOILER FUEL OIL USAGE (gal)		add (+) STEAM PIPE LOSS (mbtu)
CALCULATE FUEL OIL COST		equal (=) Steam usage (mbtu)
BOILER FUEL OIL USAGE (gal)		multiply (x) 10%, Industry standard
multiply (x) 0.73 FUEL OIL PRICE (\$/gat)		equal (=) STEAM FOR DEAERATOR (mbtu)
equal (=) FUEL OIL COST (\$)		



PEAK BOILER DEMAND (BASELINE)

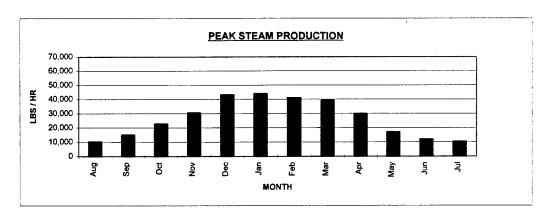
			PEAK	STEAM PRODUC	TION			
MONTH Aug '94 to Jul '95	PEAK HEATING (SCHOOL) (mbtuh)	PEAK HEATING (COMPLEX) (mbtuh)	PEAK STEAM FOR DOM. WATER (mbtuh)	PEAK STEAM FOR DEAERATOR (mbtu)	PEAK STEAM PIPE LOSS (mbtuh)	PEAK STEAM PRODUCTION (mbtuh)	PEAK STEAM PRODUCTION (lbs/hr)	# BOILERS FIRING (peak)
Aug	0.40	9.18	9.20	1.84	2.67	22.9	25,213	1
Sep	0.56		9.20	2.20	2.67	26.9	29,617	1
Oct	0.78		9.20	2.72	2.67	32.6	35,861	2
Nov	1.08		9.20	3.40	2.67	40.0		2
Dec	1.51	34.83	9.20	4.40	2.67	51.1	56,294	
Jan	1.76	40.42	9.20	4.96	2.67	57.3		
Feb	1.43	32.78	9.20	4.20	2.67	48.9		
Mar	1.29	29.75	9.20	3.89	2.67	45.5		
Apr	1.01	23.24	9.20	3.24	2.67	38.3		
May	0.68	15.57	9.20	2.48	2.67	29.9		2
Jun	0.47	10.81	9.20	2.00	2.67			
Jul	0.42	9.57	9.20	1.88	2.67	23.3	25,686	1

CALCULATE PEAK STEAM PRODUCTION	CALCULATE BOILER-FEED WATER PUMP SIZE				
PEAK HEATING (SCHOOL) (mbtuh) [Calculated]		63,068 lbs/hr (PEAK STEAM PRODUCTION)			
divide (/) Area of school (SF)	multiply (x)	0.01782 cf/lb (Specific volume water at 330F)			
multiply (x) Area of complex (SF)	multiply (x)	55.96 gal/cf (Density of water at 330F)			
equal (=) PEAK HEATING (COMPLEX) (mbtuh)	equal (=)	62,892 gal/hr (Peak water usage)			
add (+) PEAK STEAM FOR DOM. WATER (mbtuh)	multiply (x)	10% (Percent boiler-feed water)			
add (+) PEAK STEAM FOR DEAERATOR (mbtuh)	equal (=)	6,289 gat/hr (Boiler-feed water)			
add (+) PEAK STEAM PIPE LOSS (mbtuh)	divide (/)	60 min/hr			
equal (=) PEAK STEAM PRODUCTION (mbtuh)	equal (=)	105 gpm (Boiler-feed water)			
multiply (x) 1,000,000 btu/mbtu					
divide (/) 907.8 btu/lb (Latent heat of evaporation)	1050	gpm at 125psi, boiler feed water			
equal (=) PEAK STEAM PRODUCTION (lbs/hr)	2 pu	ımps (60gpm, 350 feet), 15 hp			
CALCULATE NUMBER OF BOILERS FIRING	CALCULATE STEAM FOR DOMESTIC WATER				
IF up to 30,000 lbs/hr: Boiler-1 on, Boiler-2 off, Boiler-3 off		8,044 mbtu (STEAM PRODUCTION in July)			
IF 30,001 lbs/hr to 60,000 lbs: Boiler-1 on, Boiler-2 on, Boiler-3 off	subtract (-)	3,107 mbtu (STEAM FOR HEATING in July)			
IF greater than 60,000 lbs: Boiler-1 on, Boiler-2 on, Boiler-3 on	subtract (-)	804 mbtu (STEAM FOR DEAERATOR in July)			
CALCULATE STEAM PIPE LOSS	subtract (-)	1,926 mbtu (STEAM PIPE LOSS in July)			
-23,109 mbtu (pipe loss per year from 'Steam Dist. Study')	equal (=)	2,207 mbtu (STEAM FOR DOM. WATER per month)			
divide (/) 12 months per year	divide (/)	(30*8) 30days per month, 8 hours use per day			
equal (=) -1,926 mbtu (STEAM PIPE LOSS)	equal (=)	9.20 PEAK STEAM FOR DOM. WATER (mbtuh)			
divide (/) (30°24) (30 days per month, 24 hours per day)		CALCULATE STEAM FOR DEAERATOR			
equal (=) -2.67 mbtuh (STEAM PIPE LOSS)		AK HEATING (COMPLEX) (mbtuh)			
		AK STEAM FOR DOM. WATER (mbtuh)			
	add (+) PEAK STEAM PIPE LOSS (mbtuh)				
	equal (=) Peak steam usage (mbtuh)				
	multiply (x) 10%, Industry standard				
	equal (=) PEA	AK STEAM FOR DEAERATOR (mbtuh)			



				PEAK STEAM PR	ODUCTION	-			
MONTH	PEAK	PEAK	PEAK	PEAK STEAM	PEAK STEAM	PEAK	PEAK	PEAK	#
Aug '94 to	HEATING	HEATING	HEATING	FOR DOM.	FOR	STEAM	STEAM	STEAM	BOILERS
Jul '95	(SCHOOL 45F)	(ABANDONED)	(ACTIVE)	WATER	DEAERATOR	PIPE LOSS	PRODUCTION	PRODUCTION	FIRING
	(mbtuh)	(mbtuh)	(mbtuh)	(mbtuh)	(mbtu)	(mbtuh)	(mbtuh)	(lbs/hr)	(peak)
August	0.091	2.09	1.88	1.88	0.85	2.67	9.4	10,340	1
September	0.233	5.36	2.63	1.88	1.25	2.67	13.8	15,201	1
October	0.459	10.56	3.68	1.88	1.88	2.67	20.7	22,780	1
November	0.679	15.62	5.08	1.88	2.53	2.67	27.8	30,603	2
December	1.050	24.16	7.14	1.88	3.59	2.67	39.4	43,441	2
January	1.021	23.49	8.28	1.88	3.63	2.67	40.0	44,020	2
February	0.987	22.71	6.72	1.88	3.40	2.67	37.4	41,176	2
March	0.947	21.79	6.09	1.88	3.24	2.67	35.7	39,307	2
April	0.668	15.37	4.76	1.88	2.47	2.67	27.2	29,914	1
May	0.278	6.40	3.19	1.88	1.41	2.67	15.6	17,140	1
June	0.137	3.15	2.22	1.88	0.99	2.67	10.9	12,028	1
July	0.093	2.14	1.96	1.88	0.87	2.67	9.5	10,493	1

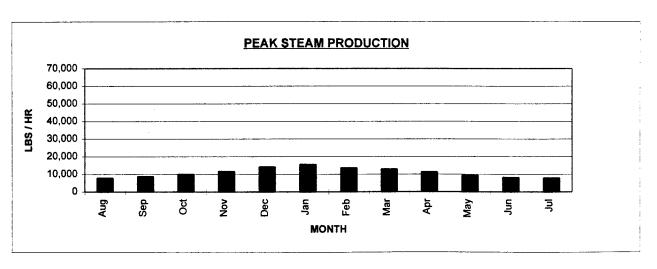
	CALCULATE PEAK STEAM PRODUCTION	CAL	CULATE BOILER-FEED WATER PUMP SIZE				
PEA)	K HEATING (SCHOOL 45F) (mbtuh) [Calculated]		44,020 lbs/hr (PEAK STEAM PRODUCTION)				
divide (/) Area	of school (SF)	multiply (x)	0.01782 cf/lb (Specific volume water at 330F)				
multiply (x) Area	of abandoned (SF)	multiply (x)	55.96 gal/cf (Density of water at 330F)				
equal (=) PEA	K HEATING (ABANDONED) (mbtuh)	equal (=)	43,897 gal/hr (Peak water usage)				
add (+) PEA	(HEATING (MODIFIED) (mbtuh)	multiply (x)	10% (Percent boiler-feed water)				
add (+) PEA	K STEAM FOR DOM, WATER (mbtuh)	equal (=)	4,390 gal/hr (Boiler-feed water)				
add (+) PEAI	K STEAM FOR DEAERATOR (mbtuh)	divide (/)	60 min/hr				
add (+) PEAI	K STEAM PIPE LOSS (mbtuh)	equal (=)	73 gpm (Boiler-feed water)				
equal (=) PEAI	K STEAM PRODUCTION (mbtuh)						
multiply (x) 1,000	0,000 btu/mbtu	73gpm at 125psi, boiler feed water					
divide (/) 907.8	B btu/lb (Latent heat of evaporation)	2 pumps (46gpm, 350 feet), 10 hp					
equal (=) PEAI	K STEAM PRODUCTION (lbs/hr)	CA	LCULATE STEAM FOR DOMESTIC WATER				
	CALCULATE NUMBER OF BOILERS FIRING	PEAK STEAM FOR DOM, WATER [Complex] (mbtuh)					
F up to 30,000 lbs/h	r: Boiler-1 on, Boiler-2 off, Boiler-3 off	divide (/) Area of complex (SF)					
F 30,001 lbs/hr to 6	0,000 lbs: Boiler-1 on, Boiler-2 on, Boiler-3 off	multiply (x) Ar	rea of modified (SF)				
F greater than 60,00	00 lbs: Boiler-1 on, Boiler-2 on, Boiler-3 on	equal (=) P8	EAK STEAM FOR DOM. WATER [Modified] (mbtuh)				
	CALCULATE STEAM PIPE LOSS		CALCULATE STEAM FOR DEAERATOR				
	-23,109 mbtu (pipe loss per year from 'Steam Dist. Study')	PE	EAK HEATING (ABANDONED) (mbtuh)				
divide (/)	12 months per year	add (+) PE	EAK HEATING (MODIFIED) (mbtuh)				
equal (=)	-1,926 mbtu (STEAM PIPE LOSS)	add (+) PE	EAK STEAM FOR DOM. WATER (mbtuh)				
divide (/)	(30°24) (30 days per month, 24 hours per day)	add (+) PE	EAK STEAM PIPE LOSS (mbtuh)				
equal (=)	-2.67 mbtuh (STEAM PIPE LOSS)	equal (=) Pe	eak steam usage (mbtuh)				
		multiply (x) 10	%, Industry standard				
		equal (=) PE	EAK STEAM FOR DEAERATOR (mbtuh)				



PEAK BOILER DEMAND (ABANDONED BUILDINGS UNHEATED)

	PEAK STEAM PRODUCTION										
MONTH	PEAK	PEAK	PEAK STEAM	PEAK STEAM	PEAK	PEAK	PEAK	#			
Aug '94 to	HEATING	HEATING	FOR DOM.	FOR	STEAM	STEAM	STEAM	BOILERS			
Jul '95	(SCHOOL)	(ACTIVE)	WATER	DEAERATOR	PIPE LOSS	PRODUCTION	PRODUCTION	FIRING			
	(mbtuh)	(mbtuh)	(mbtuh)	(mbtu)	(mbtuh)	(mbtuh)	(lbs/hr)	(peak)			
August	0.399	1.88	1.88	0.64	2.67	7.1	7,803	1			
September	0.557	2.63	1.88	0.72	2.67	7.9	8,705	1			
October	0.781	3.68	1.88	0.82	2.67	9.1	9,985	1			
November	1.077	5.08	1.88	0.96	2.67	10.6	11,675	1			
December	1.514	7.14	1.88	1.17	2.67	12.9	14,171	1			
January	1.757	8.28	1.88	1.28	2.67	14.1	15,559	1			
February	1.425	6.72	1.88	1.13	2.67	12.4	13,663	1			
March	1.293	6.09	1.88	1.07	2.67	11.7	12,909	1			
April	1.010	4.76	1.88	0.93	2.67	10.3	11,293	1			
May	0.677	3.19	1.88	0.77	2.67	8.5	9,391	1			
June	0.470	2.22	1.88	0.68	2.67	7.5	8,209	1			
July	0.416	1.96	1.88	0.65	2.67	7.2	7,900	1			

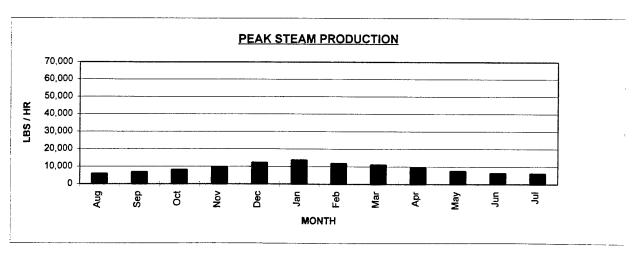
CALCULATE PEAK STEAM PRODUCTION	CALCULATE BOILER-FEED WATER PUMP SIZE					
PEAK HEATING (SCHOOL) (mbtuh) [Calculated]	15,559 lbs/hr (Peak steam produced)					
divide (/) Area of school (SF)	multiply (x) 0.01782 cf/lb (specific volume water at 330F)					
multiply (x) Area of modified (SF)	multiply (x) 55.96 gal/cf (density of water at 330F)					
equal (=) PEAK HEATING (MODIFIED) (mbtuh)	equal (=) 15,516 gal/hr (water)					
add (+) PEAK STEAM FOR DOM. WATER (mbtuh)	multiply (x) 10% (percent boiler-feed water)					
add (+) PEAK STEAM FOR DEAERATOR (mbtuh)	equal (=) 1,552 gal/hr (boiler-feed water)					
add (+) PEAK STEAM PIPE LOSS (mbtuh)	divide (/) 60 min/hr					
equal (=) PEAK STEAM PRODUCTION (mbtuh)	equal (=) 26 gpm (boiler-feed water)					
multiply (x) 1,000,000 btu/mbtu						
divide (/) 907.8 btu/lb (Latent heat of evaporation)	26gpm at 125psi, boiler feed water					
equal (=) PEAK STEAM PRODUCTION (lbs/hr)	1 pump (17gpm, 350 feet), 7 1/2 hp					
CALCULATE NUMBER OF BOILERS FIRING	CALCULATE STEAM FOR DOMESTIC WATER					
IF up to 30,000 lbs/hr: Boiler-1 on, Boiler-2 off, Boiler-3 off	PEAK STEAM FOR DOM. WATER [Complex] (mbtuh)					
IF 30,001 lbs/hr to 60,000 lbs: Boiler-1 on, Boiler-2 on, Boiler-3 off	divide (/) Area of complex (SF)					
IF greater than 60,000 lbs: Boiler-1 on, Boiler-2 on, Boiler-3 on	multiply (x) Area of modified (SF)					
CALCULATE STEAM PIPE LOSS	equal (=) PEAK STEAM FOR DOM. WATER [Modified] (mbtuh)					
-23,109 mbtu (pipe loss per year from 'Steam Dist. Study')	CALCULATE STEAM FOR DEAERATOR					
divide (/) 12 months per year	PEAK HEATING (MODIFIED) (mbtuh)					
equal (=) -1,926 mbtu (STEAM PIPE LOSS)	add (+) PEAK STEAM FOR DOM. WATER (mbtuh)					
divide (/) (30*24) (30 days per month, 24 hours per day)	add (+) PEAK STEAM PIPE LOSS (mbtuh)					
equal (=) -2.67 mbtuh (STEAM PIPE LOSS)	equal (=) Peak steam usage (mbtuh)					
	multiply (x) 10%, Industry standard					
	equal (=) PEAK STEAM FOR DEAERATOR (mbtuh)					



PEAK BOILER DEMAND (ABANDONED BUILDINGS UNHEATED) (SELECTED STEAM PIPING ABANDONED)

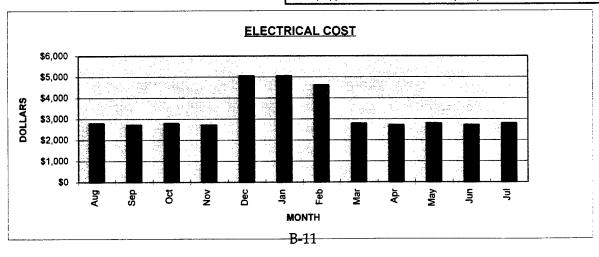
			PEAK	STEAM PRODUC	TION			
MONTH	PEAK	PEAK	PEAK STEAM	PEAK STEAM	PEAK	PEAK	PEAK	#
Aug '94 to	HEATING	HEATING	FOR DOM.	FOR	STEAM	STEAM	STEAM	BOILERS
Jul '95	(SCHOOL)	(MODIFIED)	WATER	DEAERATOR	PIPE LOSS	PRODUCTION	PRODUCTION	FIRING
	(mbtuh)	(mbtuh)	(mbtuh)	(mbtu)	(mbtuh)	(mbtuh)	(lbs/hr)	(peak)
August	0.399	1.88	1.88	0.49	1.11	5.4	5,907	1
September	0.557	2.63	1.88	0.56	1.11	6.2	6,809	1
October	0.781	3.68	1.88	0.67	1.11	7.3	8,089	1
November	1.077	5.08	1.88	0.81	1.11	8.9	9,779	1
December	1.514	7.14	1.88	1.01	1.11	11.1	12,275	1
January	1.757	8.28	1.88	1.13	1.11	12.4	13,663	1
February	1.425	6.72	1.88	0.97	1.11	10.7	11,767	1
March	1.293	6.09	1.88	0.91	1.11	10.0	11,013	1
April	1.010	4.76	1.88	0.78	1.11	8.5	9,397	1
May	0.677	3.19	1.88	0.62	1.11	6.8	7,495	1
June	0.470	2.22	1.88	0.52	1.11	5.7	6,312	1
July	0.416	1.96	1.88	0.50	1.11	5.5	6,004	1

CALCULATE PEAK STEAM PRODUCTION	CALCULATE BOILER-FEED WATER PUMP SIZE				
PEAK HEATING (SCHOOL) (mbtuh) [Calculated]	13,663 lbs/hr (Peak steam produced)				
divide (/) Area of school (SF)	multiply (x) 0.01782 cf/lb (specific volume water at 330F)				
multiply (x) Area of modified (SF)	multiply (x) 55.96 gal/cf (density of water at 330F)				
equal (=) PEAK HEATING (MODIFIED) (mbtuh)	equal (=) 13,625 gal/hr (water)				
add (+) PEAK STEAM FOR DOM. WATER (mbtuh)	multiply (x) 10% (percent boiler-feed water)				
add (+) PEAK STEAM FOR DEAERATOR (mbtuh)	equal (=) 1,362 gal/hr (boiler-feed water)				
add (+) PEAK STEAM PIPE LOSS (mbtuh)	divide (/) 60 min/hr				
equal (=) PEAK STEAM PRODUCTION (mbtuh)	equal (=) 23 gpm (boiler-feed water)				
multiply (x) 1,000,000 btu/mbtu					
divide (/) 907.8 btu/lb (Latent heat of evaporation)	23gpm at 125psi, boiler feed water				
equal (=) PEAK STEAM PRODUCTION (lbs/hr)	1 pump (26 gpm, 350 feet), 7 1/2 hp				
CALCULATE NUMBER OF BOILERS FIRING	CALCULATE STEAM FOR DOMESTIC WATER				
IF up to 30,000 lbs/hr: Boiler-1 on, Boiler-2 off, Boiler-3 off	PEAK STEAM FOR DOM. WATER [Complex] (mbtuh)				
IF 30,001 lbs/hr to 60,000 lbs: Boiler-1 on, Boiler-2 on, Boiler-3 off	divide (/) Area of complex (SF)				
IF greater than 60,000 lbs: Boiler-1 on, Boiler-2 on, Boiler-3 on	multiply (x) Area of modified (SF)				
CALCULATE PIPE HEAT LOSS	equal (=) PEAK STEAM FOR DOM, WATER [Modified] (mbtuh)				
-9,589 mbtu (pipe loss per year) [Calculated]	CALCULATE STEAM USED FOR DEAERATOR				
divide (/) 12 months per year	PEAK HEATING (ABANDONED) (mbtuh)				
equal (=) -799 mbtu (STEAM PIPE LOSS)	add (+) PEAK HEATING (MODIFIED) (mbtuh)				
divide (/) (30*24) (30 days per month, 24 hours per day)	add (+) PEAK STEAM FOR DOM. WATER (mbtuh)				
equal (=) -1.11 mbtuh (STEAM PIPE LOSS)	add (+) PEAK STEAM PIPE LOSS (mbtuh)				
	equal (=) Peak steam usage (mbtuh)				
	multiply (x) 10%, Industry standard				
	equal (=) PEAK STEAM FOR DEAERATOR (mbtuh)				



				BOILE	R FIRING TIME					
MONTH	AVERAGE	AVERAGE	AVE STEAM	AVE STEAM	AVERAGE	AVERAGE	AVERAGE	#	#	BOILER
Aug '94 to	HEATING	HEATING	FOR DOM.	FOR	STEAM	STEAM	STEAM	BOILERS	DAYS	FIRING
Jul '95	(SCHOOL)	(COMPLEX)	WATER	DEAERATOR	PIPE LOSS	PRODUCTION	PRODUCTION	FIRING		TIME
	(mbtuh)	(mbtuh)	(mbtuh)	(mbtuh)	(mbtuh)	(lbs/hr)	(lbs/hr)	(average)		(hours)
August	0.191	4.39	3.07	1.01	. 2.67	11.1	12,280	1	31	744
September	0.300	6.90	3.07	1.26	2.67	13.9	15,318	1	30	720
October	0.529	12.17	3.07	1.79	2.67	19.7	21,702	1	31	744
November	0.784	18.04	3.07	2.38	2.67	26.2	28,810	1	30	720
December	0.975	22.43	3.07	2.82	2.67	31.0	34,134	2	31	1,488
January	1.037	23.86	3.07	2.96	2.67	32.6	35,863	2	31	1,488
February	0.942	21.67	3.07	2.74	2.67	30.2	33,215	2	28	1,344
March	0.777	17.87	3.07	2.36	2.67	26.0	28,615	11	31	744
April	0.563	12.95	3.07	1.87	2.67	20.6	22,650	1	30	720
May	0.324	7.45	3.07	1.32	2.67	14.5	15,987	1	31	744
June	0.223	5.13	3.07	1.09	2.67	12.0	13,172	1	30	720
July	0.181	4.16	3.07	0.99	2.67	10.9	12,001	1	31	744
TOTAL										10,920

C	ALCULATE AVERAGE STEAM PRODUCTION		CALCULATE	ELECTRICAL CO	ST PER YEAR		
AV	ERAGE HEATING (SCHOOL) (mbtuh) [Calculated]	(2) 25hp far	ns per boiler	32.64	kw (boilers)		
divide (/) Are	ea of school (SF)	(1) 15 hp pun	np per boiler (+)	10.08	kw (pump)		
multiply (x) Are	a of complex (SF)		equal (=)	42.72	kw (per boiler)		
equal (=) AV	ERAGE HEATING (COMPLEX) (mbtuh)	ļ	multiply (x)	10,920	BOILER FIRING TIME (hours)		
add (+) AV	E STEAM FOR DOM. WATER (mbtuh)		equal (=)	466,502	kwh		
add (+) AV	E STEAM FOR DEAERATOR (mbtuh)	Cost	of electricity (x)	0.0711	\$/kwh		
add (+) AV	ERAGE STEAM PIPE LOSS (mbtuh)		equal (=)	\$33,168	(Electrical rate cost)		
equai (≃) AV	ERAGE STEAM PRODUCTION (mbtuh)						
multiply (x) 1,0	00,000 btu/mbtu	pea	ak electrical load	42.72	kw (per boiler)		
divide (/) 907	7.8 btu/lb (Latent heat of evaporation)		multiply (x)	2	boilers firing		
equai (≂) AV	ERAGE STEAM PRODUCTION (lbs/hr)		equal (=)	85	kw (peak demand)		
	CALCULATE BOILER FIRING TIME	der	mand charge (x)	6.25	\$/kw		
IF up to 30,000 lbs.	/hr: Boiler-1 on, Boiler-2 off, Boiler-3 off	1	equal (=)	\$6,408	(Electrical demand charge)		
IF 30,001 lbs/hr to	60,000 lbs: Boiler-1 on, Boiler-2 on, Boiler-3 off						
IF greater than 60,0	000 lbs: Boiler-1 on, Boiler-2 on, Boiler-3 on			\$33,168	(Electrical rate cost)		
	#BOILERS FIRING		add (+)	\$6,408	(Electrical demand charge)		
	multiply (x) Days in month x 24 hours per day		equal (=)	\$39,576	(Total Electrical Cost)		
	equal (=) BOILER FIRING TIME (hours)	CALCULATE STEAL	M FOR DOMES	TIC WATER			
	CALCULATE STEAM PIPE LOSS	1	2,207	STEAM FOR DOM	I. WATER [Complex] (mbtu)		
	-23,109 mbtu (pipe loss per year from 'Steam Dist. Study')	divide (/)	720	(30 Days per mont	h x 24 hours per day)		
divide (/)	12 months per year	equal (=)	3.07	AVE STEAM FOR	DOM. WATER (mbtuh)		
equal (=)	-1,926 mbtu (STEAM PIPE LOSS)		CALCULA	TE STEAM FOR D	<u>EAERATOR</u>		
divide (/)	(30°24) (30 days per month, 24 hours per day)	AVE	RAGE HEATIN	G (COMPLEX) (m)	otuh)		
equal (=)	-2.67 mbtuh (STEAM PIPE LOSS)	add (+) AVE	STEAM FOR D	OM. WATER (mbi	tuh)		
		add (+) AVERAGE STEAM PIPE LOSS (mbtuh)					
		equal (=) Average steam usage (mbtuh)					
		multiply (x) 10%, Industry standard					
		equal (=) AVE	STEAM FOR D	EAERATOR (mbti	uh)		



ANNUAL CENTRAL PLANT ELECTRICITY USAGE (ABANDONED BUILDINGS HEATED TO 45F)

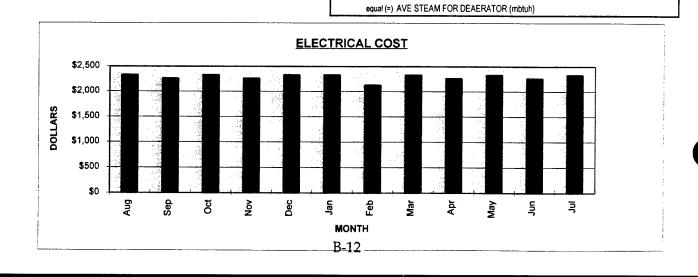
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					BOILER FIR	ING TIME					
MONTH	AVERAGE	AVERAGE	AVERAGE	AVE STEAM	AVE STEAM	AVERAGE	AVERAGE	AVERAGE	#	#	BOILER
Aug '94 to	HEATING	HEATING	HEATING	FOR DOM.	FOR	STEAM	STEAM	STEAM	BOILERS	DAYS	FIRING
Jul '95	(SCHOOL)	(ABANDONED)	(ACTIVE)	WATER	DEAERATOR	PIPE LOSS	PRODUCTION	PRODUCTION	FIRING		TIME
	(mbtuh)	(mbtuh)	(mbtuh)	(mbtuh)	(mbtuh)	(mbtuh)	(mbtuh)	(ibs/hr)	(average)	ļ	(hours)
Aug	0.005	0.12	0.90	0.63	0.16	2.67	4.5	4,938	1	31	744
Sep	0.042	0.97	1.41	0.63	0.30	2.67	6.0	6,592	1	30	720
Oct	0.212	4.88	2.49	0.63	0.80	2.67	11.5	12,638	1	31	744
Nov	0.443	10.19	3.70	0.63	1.45	2.67	18.6	20,534	1	30	720
Dec	0.631	14.52	4.60	0.63	1.97	2.67	24.4	26,866	1	31	744
Jan	0.674	15.51	4.89	0.63	2.10	2.67	25.8	28,418	1	31	744
Feb	0.592	13.62	4.44	0.63	1.87	2.67	23.2	25,590	1	28	672
Mar	0.457	10.51	3.66	0.63	1.48	2.67	19.0	20,884	1	31	744
Apr	0.266	6.12	2.65	0.63	0.94	2.67	13.0	14,338	1	30	720
May	0.077	1.77	1.53	0.63	0.39	2.67	7.0	7,704	1	31	744
Jun	0.015	0.35	1.05	0.63	0.20	2.67	4.9	5,399	1	30	720
Jul	0.003	0.07	0.85	0.63	0.16	2.67	4.4	4,825	1	31	744
TOTAL											8,760

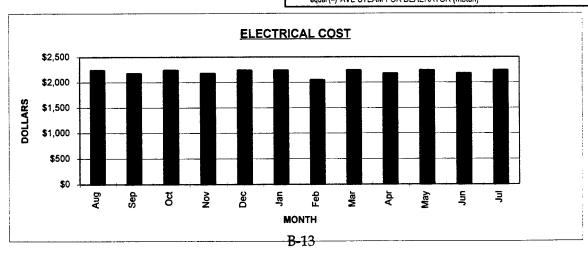
TOTAL				8,760
	CALCULATE AVERAGE STEAM PRODUCTION	<u>CALCULATE</u> E	LECTRICA	L COST PER YEAR
	AVERAGE HEATING (SCHOOL) (mbtuh) [Calculated]	(2) 25hp fans per boiler	32.64	kw (boilers) [From 'Boiler Efficiency Study']
divide (/)	Area of school (SF)	(1) 10 hp pump per boiler (+)	6.72	kw (pump)
multiply (x)	Area of abandoned (SF)	equal (=)	39.36	kw (per boiler)
equal (=)	AVERAGE HEATING (ABANDONED) (mbtuh)	multiply (x)	8,760	BOILER FIRING TIME (hours)
add (+)	AVERAGE HEATING (MODIFIED) (mbuth)	equal (=)	344,794	kwh
add (+)	AVE STEAM FOR DOM. WATER (mbtuh)	Cost of electricity (x)	0.0711	\$/kwh
add (+)	AVE STEAM FOR DEAERATOR (mbtuh) (Calculated)	equal (=)	\$24,515	(Electrical rate cost)
add (+)	AVERAGE STEAM PIPE LOSS (mbtuh) (Calculated)			
equal (=)	AVEREAGE STEAM PRODUCTION (mbtuh)	ave electrical load	39.36	kw (per boiler)
multiply (x)	1,000,000 btu/mbtu	multiply (x)	1	boilers firing
divide (/)	907.8 btu/lb (Latent heat of evaporation)	equal (=)	39	kw (peak demand)
equal (=)	AVERAGE STEAM PRODUCTION (lbs/hr)	demand charge (x)	6.25	\$/kw
	CALCULATE BOILER FIRING TIME	equal (=)	\$2,952	(Electrical demand charge)
	000 lbs/hr. Boiler-1 on, Boiler-2 off, Boiler-3 off			
1	os/hr to 60,000 lbs: Boiler-1 on, Boiler-2 on, Boiler-3 off		\$24,515	(Electrical rate cost)
IF greater t	han 60,000 lbs: Boiler-1 on, Boiler-2 on, Boiler-3 on	add (+)	\$2,952	(Electrical demand charge)
	# BOILERS FIRING	equal (=)	\$27,467	(Total Electrical Cost)
	multiply (x) Days in month x 24 hours per day	_CALCULATE S	TEAM FOR	DOMESTIC WATER
	equal (=) BOILER FIRING TIME (hours)	AVE STEAM FOR DOM	I. WATER [Complex] (mbtuh)
	CALCULATE STEAM PIPE LOSS	divide (/) Area of complex (SF)		
	-23,109 mbtu (pipe loss per year from 'Steam Dist. Study')	multiply (x) Area of modified (SF)		
divide (/)	12 months per year	equal (=) AVE STEAM FOR DOM	I. WATER [I	Modified] (mbtuh)
equal (=)	-1,926 mbtu (STEAM PIPE LOSS)	CALCULATE	STEAM F	OR DEAERATOR
divide (/)	(30°24) (30 days per month, 24 hours per day)	AVERAGE HEATING (A	BANDONE	D) (mbtuh)
equal (=)	-2.67 mbtuh (STEAM PIPE LOSS)	add (+) AVERAGE HEATING (M	(ODIFIED)	(mbtuh)

add (+) AVE STEAM FOR DOM. WATER (mbtuh) add (+) AVERAGE STEAM PIPE LOSS (mbtuh) equal (=) Average steam usage (mbtuh) muttiply (x) 10%, Industry standard



ANNUAL CENTRAL PLANT ELECTRICITY USAGE (ABANDONED BUILDINGS UNHEATED)

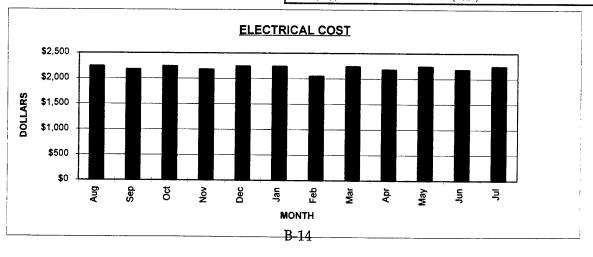
				BOILER FIR	NG TIME					
MONTH	AVERAGE	AVERAGE	AVE STEAM	AVE STEAM	AVERAGE	AVERAGE	AVERAGE	#	#	BOILER
Aug '94 to	HEATING	HEATING	FOR DOM.	FOR	STEAM	STEAM	STEAM	BOILERS	DAYS	FIRING
Jul '95	(SCHOOL)	(ACTIVE)	WATER	DEAERATOR	PIPE LOSS	PRODUCTION	PRODUCTION	FIRING		TIME
	(mbtuh)	(mbtuh)	(mbtuh)	(mbtuh)	(mbtuh)	(mbtuh)	(lbs/hr)	(average)		(hours)
August	0.191	0.90	0.63	0.15	2.67	4.4	4,798	1	31	744
September	0.300	1.41	0.63	0.20	2.67	4.9	5,421	1	30	720
October	0.529	2.49	0.63	0.31	2.67	6.1	6,729	1	31	744
November	0.784	3.70	0.63	0.43	2.67	7.4	8,185	1	30	720
December	0.975	4.60	0.63	0.52	2.67	8.4	9,276	1	31	744
January	1.037	4.89	0.63	0.55	2.67	8.7	9,630	1	31	744
February	0.942	4.44	0.63	0.51	2.67	8.2	9,088	1	28	672
March	0.777	3.66	0.63	0.43	2.67	7.4	8,145	1	31	744
April	0.563	2.65	0.63	0.33	2.67	6.3	6,923	1	30	720
May	0.324	1.53	0.63	0.22	2.67	5.0	5,558	1	31	744
June	0.223	1.05	0.63	0.17	2.67	4.5	4,981	1	30	720
July	0.181	0.85	0.63	0.15	2.67	4.3	4,889	1	31	744
TOTAL	-						-			8,760
	CALCULATE	AVERAGE STE	AM PRODUCTION	<u> </u>	CALCULATE ELECTRICAL COST PER YEAR					
			(mbtuh) [Calculat		(2) 25hp fans per boiler 32.64 kw (boilers)					
divide (/)	Area of school (•		•		(1) 7 1/2 hp pump (+)	5.28	kw (pump)		
multiply (x)	Area of modified	•				equal (=)	37.92	kw (per boiler)	
equal (=)		TING (MODIFIE	D) (mbtuh)		multiply (x) 8,760 boiler firing hours			ours		
add (+)		OR DOM. WATER			equal (=) 332,179 kwh					
add (+)		R DEAERATOR				Cost of electricity (x)	0.0711	\$/kwh		
add (+)		AM PIPE LOSS	-			equal (=)	\$23,618	(Electrical rate	e cost)	
equal (=)		AM PRODUCTIO								
multiply (x)	1,000,000 btu/m	btu			ave electrical load 37.92 kw (per boiler))	
divide (/)	907.8 btu/lb (Lat	ent heat of evapor	oration)		•	multiply (x)	1	boilers firing		
equal (=)	· ·	AM PRODUCTIO				equal (=)	38	kw (total dem	and)	
	CALCU	LATE BOILER F	IRING TIME			demand charge (x)	6.25	\$/kw		
IF up to 30,00	00 lbs/hr: Boiler-1	on, Boiler-2 off, E	Boiler-3 off		equal (=) \$2,844 (Electrical demand charg					
IF 30,001 lbs	/hr to 60,000 lbs: E	Boiler-1 on, Boile	r-2 on, Boiler-3 off							
IF greater tha	an 60,000 lbs: Boile	er-1 on, Boiler-2	on, Boiler-3 on				\$23,618	(Electrical rat	e cost)	
_		# BOILERS FIR				add (+)	\$2,844	(Electrical de	mand charge	a)
	multiply (x)	Days in month x	24 hours per day			equal (=)	\$26,462	(Total electric	al cost)	
	equal (=)	BOILER FIRING	TIME (hours)			CALCULATE	STEAM FOR DOM	ESTIC WATE	R	
		JLATE STEAM	PIPE LOSS			AVE STEAM FOR	DOM. WATER [Con	nplex] (mbtuh)	-	
	-23,109	mbtu (pipe loss	per year from 'Stea	m Dist. Study')	divide (/)	Area of complex (S	F)			
divide (/)		months per year			multiply (x)	Area of modified (S	F)			
equal (=)	-1,926	mbtu (STEAM P	IPE LOSS)		equal (=)	AVE STEAM FOR	DOM. WATER [Mod	fified] (mbtuh)		
divide (/)		•	nth, 24 hours per o	iay)		CALCULATE	STEAM USED FO	R DEAERATO	R	
equal (=)		mbtuh (STEAM	PIPE LOSS)			AVERAGE HEATIN	IG (MODIFIED) (mb	otuh)		
					add (+)	AVE STEAM FOR	DOM. WATER (mbl	uh)		
					add (+)	AVERAGE STEAM	PIPE LOSS (mbtul	1)		
					equal (=) Average steam usage (mbtuh)					
					multiply (x) 10%, industry standard					
					equal (=)	AVE STEAM FOR	DEAERATOR (mbti	Jh)		



ANNUAL CENTRAL PLANT ELECTRICITY USAGE (ABANDONED BUILDINGS UNHEATED) (SELECTED STEAM PIPING ABANDONED)

•		9
	ı	v

				BOILER FIR	ING TIME						
MONTH	AVERAGE	AVERAGE	AVE STEAM	AVE STEAM	AVERAGE	AVERAGE	AVERAGE	#	#	BOILER	
Aug '94 to	HEATING	HEATING	FOR DOM.	FOR	STEAM	STEAM	STEAM	BOILERS	DAYS	FIRING	
Jul '95	(SCHOOL)	(MODIFIED)	WATER	DEAERATOR	PIPE LOSS	PRODUCTION	PRODUCTION	FIRING		TIME	
	(mbtuh)	(mbtuh)	(mbtuh)	(mbtuh)	(mbtuh)	(mbtuh)	(lbs/hr)	(average)		(hours)	
August	0.191	0.90	0.63	0.26	1.11	2.9	3,197	1	31	74	
September	0.300	1.41	0.63	0.32	1.11	3.5	3,819	1	30	72	
October	0.529	2.49	0.63	0.42	1.11	4.7	5,127	1	31	74	
November	0.784	3.70	0.63	0.54	1.11	6.0	6,584	1	30	72	
December	0.975	4.60	0.63	0.63	1.11	7.0	7,675	1	31	74	
January	1.037	4.89	0.63	0.66	1.11	7.3	8,029		31	74	
February	0.942	4.44	0.63	0.62	1.11	6.8	7,486		28	67:	
March	0.777	3.66	0.63	0.54	1.11	5.9	6,544		31	74	
April	0.563	2.65	0.63	0.44	1.11	4.8	5,321	1	30	720	
May	0.324 1.53 0.63 0.33 1.11 3.6 3,956 1 0.223 1.05 0.63 0.28 1.11 3.1 3.380 1						31	744			
June				0.28	1.11	3.1	3,380		30	720 74	
July	0.181	0.85	0.63	0.26	26 1.11 2.9 3,140 1 31						
TOTAL CALCULATE AVERAGE STEAM PRODUCTION					CALCULATE ELECTRICAL COST PER YEAR						
			(mbtuh) [Calculate	ed]		hp fans per boiler		32.64 kw (boilers) 5.28 kw (pump)			
	Area of school (S	•			((1) 7 1/2 hp pump (+)					
	Area of modified		N (equal (=)			kw (per boiler)			
	AVERAGE HEAT AVE STEAM FO	,	, ,			multiply (x)		boiler firing ho	urs		
• •	AVE STEAM FO		, ,,,		equal (=) 332,179 kwh Cost of electricity (x) 0.0711 \$/kwh						
	AVERAGE STEA		. ,			• • • •		•			
	AVERAGE STEA	,	•		equal (=) \$23,618 (Electrical rate cost)						
	1,000,000 btu/mb					ave electrical load	kw (per boiler)				
divide (/)	907.8 btu/lb (Late	nt heat of evapo	ration)			multiply (x)		1 boilers firing			
	AVERAGE STEA	•	•			equal (=)		38 kw (total demand)			
	CALCUL	ATE TIME BOILI	RS FIRING				6.25 \$/kw				
F up to 30,000	lbs/hr: Boiler-1 o	n, Boiler-2 off, B	oiler-3 off		demand charge (x)					1	
F 30,001 lbs/h	to 60,000 lbs: Be	oiler-1 on, Boiler-	-2 on, Boiler-3 off		equal (-) \$2,044 (Electrical demand char						
F greater than	60,000 lbs: Boile	r-1 on, Boiler-2 o	n, Boiler-3 on				\$23,618	(Electrical rate	cost)		
	#	BOILERS FIRI	1G	İ		add (+)	\$2,844	(Electrical dem	nand charge)	H	
	multiply (x)	Days in month x 2	24 hours per day	Ī		equal (=)	\$2 6,462	(Total electrica	al cost)		
	equal (=) E	OILER FIRING	TIME (hours)			CALCULATE S	STEAM FOR DOM				
	CALCU	LATE STEAM P	IPE LOSS		,	AVE STEAM FOR D	OM. WATER [Con	nplex] (mbtuh)			
	-9,589 n	nbtu (pipe loss p	er year) [Calculate	d]	divide (/)	Area of complex (SF)				
divide (/)		nonths per year		Į.		Area of modified (SF					
equal (=)		nbtu (STEAM Pil	•		equal (=) /	AVE STEAM FOR D					
divide (/)			th, 24 hours per da	ay)			E STEAM FOR DI				
equal (=)	-1.11 n	nbtuh (STEAM P	IPE LOSS)			AVERAGE HEATING					
						AVE STEAM FOR D	•	•			
					add (+) AVERAGE STEAM PIPE LOSS (mbtuh)						
					equal (=) Average steam usage (mbtuh)						
						10%, Industry standa					
				j	equal (=) AVE STEAM FOR DEAERATOR (mbtuh)						



DISTRIBUTED BOILERS (ABANDONED BUILDINGS UNHEATED)

#1406.003 Ft. Greely Utility Study 3/18/96 JvS

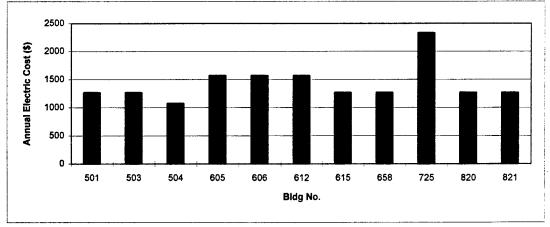
Area of Ft. Greely school:

54,604 SF

			ENERG	Y COSTS						
BLDG.	BUILDING	PEAK	15 PSIG	INPUT	NET	BLOWER	COND.	PEAK	ELECT	ELECT
#	DESCRIPTION	STEAM	BOILER		OUTPUT	SIZE	PUMP	ELEC.	USAGE	COST
		PRODUCTION	SELECTION				SIZE	DEMAND		
			(Burnham							
		(mbh)	Boiler Co.)	(mbh)	(mbh)	(hp)	(hp)	(kw)	(kwh)	(\$)
501	POST HQ	754	EXISTING			1/2	1/3	2.04	17,870	1271
503	GYMNASIUM	1083	V-912	1,764	1,445	1/2	1/3	2.04	17,870	1271
504	FIRE STATION	245	V-904	490	404	1/3	1/3	1.73	15,137	1076
60 5	CONSOLIDATED PW	984	V-911	1,596	1,314	1/2	. 1/3	2.52	22,075	1570
606	CENTRAL HEATING PLANT	1238	PF-514	1,960	1,612	1/2	1/3	2.52	22,075	1570
612	TANK MAINTENANCE	738	V-909	1,274	1,054	1/2	1/3	2.52	22,075	1570
615	MOTOR POOL	685	V-909	1,274	1,054	1/2	1/3	2.04	17,870	1271
658	TEMP MOTOR POOL	1004	V-912	1,764	1,445	1/2	1/3	2.04	17,870	1271
725	SCHOOL	2157	PF-516	3,150	2,604	2	1/3	3.74	32,797	2332
820	HOUSING UNIT	639	V-908	1,120	924	1/2	1/3	2.04	17,870	1271
821	HOUSING UNIT	639	V-908	1,120	924	1/2	1/3	2.04	17,870	1271
OTALS				15,512	12,780			25.27	221,383	15,740

NOTE: Boiler firing time equal to 8,760 hours for each boiler

CALCULATE	PEAK STEAM PRO	DUCTION	CALCULATE PEAK ELEC. DEMAND
	PEAK HEATING [C	omplex] (mbtuh)	(Blower amps + Cond. pump amps)
divide (/)	Area of school (SF)		multiply (x) 120 votls
multiply (x)	Area of bldg (SF)		divide (/) 1,000 watts/kilowatt
equal (=)	PEAK HEATING (B	LDG) (mbtuh)	equal (=) PEAK ELEC. DEMAND (kw)
add (+)	PEAK STEAM FOR	DOM, WATER (mbtuh)	CALCULATE ELECT RATE COST
equal (=)	PEAK STEAM PRO	DUCTION (mbtuh)	PEAK ELEC. DEMAND (kw)
<u>CALCULATE</u> I	PEAK ELECTRICAL	DEMAND	multiply (x) 8,760 Hours per year
	25.27	kw	equal (=) ELECT USAGE (kwh)
Cost of electricity (x)	6.25	\$/kw	multiply (x) \$0.0711/kwh
multiply (x)	12	months	equal (=) ELECT RATE COST (\$)
equal (=)	\$1,895	(Electrical demand charge)	
	\$15,740	(Electrical rate cost)	
add (+)	\$1,895	(Electrical demand charge)	
equal (=)	\$17,636	(Total electrical cost)	
CALCULA	TE TOTAL ENERGY	<u>COST</u>	
	\$197,580	Fuel oil cost	
add (+)	\$17,636	Electricity cost	
add (+)	\$934,400	Manpower cost	
equal (=)	\$1,149,616	Total Energy Cost	



FUEL OIL SYSTEMS FOR BOILERS

BUILDING	BUILDING BUILDING			MAXIMUM FUEL OIL FUEL TANK	FUEL TANK	DAYS OF PEAK
NUMBER	NUMBER DESCRIPTION	SQFT	SQFT CLASSIFICATION	USAGE (GPH)	SIZE (GAL)	OPERATION
501	POST HQ	19,095	OFFICE	N/A	EXISTING	
503	GYMNASIUM	27,430	GYM	12.6	2000	17
504	FIRE STATION	6,192	FIRE STATION	3.5	1000	12
909	CONSOLIDATED PW	24,915	OFFICE	11.4	5000	18
909	CENTRAL HEATING PLAN	31,333	UTILITY	14.0	5000	15
612	TANK MAINTENANCE	18,681	MAINTENANCE	9.1	2000	23
615	ROADS AND GROUNDS	17,351	MAINTENANCE	9.1	2000	23
658	TEMP MOTOR POOL	25,425	MAINTENANCE	12.6	2000	17
725	SCHOOL	54,604	SCHOOL	22.5	10000	19
820	HOUSING UNIT	16,175	BARRACKS/HSG	8.0	2000	26
821	HOUSING UNIT	16,175	BARRACKS/HSG	8.0	2000	26
633	SEWAGE TREATMENT	2,784	UTILITY	N/A		N/A
	TOTAL	260,160 sf				

FUEL OIL STORAGE COMPONENTS
1) 660 gal fuel oil storage tank in each building

SPECIFICATIONS

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V9 RATINGS ��⊕

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		GROSS	NET I	= B = R R/ (2)	ATING		RNER PUT	SUR	TING FACE FT.)	NET FIREBOX	PRESSURE IN FIREBOX (INCHES WTR.
BOILER MODEL (1)	BOILER HORSEPOWER	OUTPUT MBH	SQ. FT STEAM	MBH STEAM	MBH WATER	OIL (GPH)	GAS (MBH)	STEAM	WATER	VOLUME (CU. FT.)	COLUMN) (3)
V-903	9.3	311	971	233	270	2.75	397	34	37	3.2	.28
V-904	12.1	404	1263	303	351	3.5	505	48	54	4.8	.29
V-905	16.0	534	1671	401	464	4.6	668	62	71	6.4	.20
V-906	19.8	664	2075	498	577	5.8	830	77	88	7.9	.29
V-907	23.7	794	2483	596	690	6.9	992	91	105	9.5	.26
V-908	27.6	924	2888	693	803	8.0	1155	105	122	11.0	.29
V-909	31.5	1054	3296	791	917	9.1	1317	119	139	12.6	.28
V-910	35.4	1184	3700	888	1030	10.2	1479	134	156	14.2	.28
V-911	39.3	1314	4125	990	1143	11.4	1642	148	173	15.7	.28
V-912	43.2	1445	4579	1099	1257	12.6	1804	162	190	17.3	.30

- (1) Suffix "S" indicates steam boiler, "W" indicates water boiler. Suffix "G" indicates gas-fired, "O" indicates oil-fired, "GO" indicates combination gas-oil fired.
- (2) I = B = R net ratings shown are based on piping and pickup allowances which vary from 1.333 to 1.315 for steam and 1.15 for water.

 Consult manufacturer for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc.

 The I = B = R burner capacity in GPH is based on oil having a heat value of 140,000 BTU per gallon.
- (3) Boiler ratings are based on 12.5% CO2, +.10" water column pressure at boiler flue outlet.

 Ratings shown above apply at all altitudes up to 1000 feet on oil and 2000 feet on gas. For altitudes above those indicated, the ratings should be reduced at the rate of 4% for each 1000 feet above sea level.

NOTE: Maximum Allowable Working Pressure -

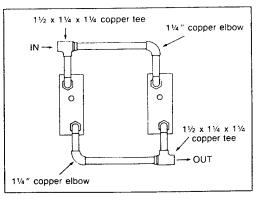
Steam 15 PSI
Water (USA Standard) 50 PSI
Water (USA Optional) 70 PSI
Water (Canada) 45 PSI

TANKLESS HEATER RATINGS (Water & Steam)

BOILER			V9-2 TANI INSTALL	
MODEL	1	2	3	4
V-903	6.0	-		_
V-904	7.5		_	_
V-905	7.5	-		
V-906	7.5	13	_	_
V-907	7.5	15		
V-908	7.5	15	_	
V-909	7.5	15	21	_
V-910	7.5	15	22.5	
V-911	7.5	15	22.5	-
V-912	7.5	15	22.5	28.5

*Ratings are given in gallons per minute continuous flow of water heated from 40°F to 140°F with 200°F boiler water.

Two Heater Manifold





SPECIFICATIONS



PF-5 RATINGS

				(1=28 = Rating (2	R	- C	= R er #** ity ***	Net *	Pressure In Firebox	168	ry School)	Water G	Content
Botter Standar	SIP.	PART AND		Steam MBH	Water MBH 3 4 (3)	Light Oil GPH (4)	Gas MBH	Firebax Motume Pt. 1	Water Column) (5)	Social P	Tibe		Water
PF-504	18.5	620	1938	465	539	5.5	79 0	8.5	. 244	57.45	66.12	58	70
PF-505	23.4	785	2454	589	683	6.9	9 97	11.1	. 24 4	73.44	85.00	69	84
PF-506	28.4	951	2971	713	827	8.3	1 204	13.7	. 24 5	89.43	103.88	81	98
PF-507	33.3	1116	3488	837	970	9.8	1412	16.3	.245	105.42	122.76	92	112
PF-508	38.2	1281	4013	963	1114	11.2	1619	18.9	.246	121.41	141.64	104	127
PF-509	43.2	1446	4583	1100	1257	12.6	1826	21.4	.246	137.40	160.52	115	141
PF-510	48.2	1612	5158	1238	1402	14.0	2033	24.1	.247	153.39	179.40	126	156
PF-511	53.1	1777	5725	1374	1545	15.6	2240	26.8	.247	169.38	198.28	138	170
PF-512	58.1	1942	6283	1508	1689	17.0	2448	29.4	.248	185.37	217.16	149	184
PF-513	63.0	2108	6821	1637	1833	18 4	2655	32.0	.248	201.36	236.04	161	198
PF-514	67.9	2273	7354	1765	1977	19.8	2862	34.6	.249	217.35	254.92	172	212
PF-515	72.9	2438	7888	1893	2120	21.5	3069	37.2	.249	233.34	273.80	184	226
PF-516	77.8	2604	8425	2022	2264	22.5	3276	39.8	.250	249.33	292.68	195	240
PF-517	82.7	2769	8958	2150	2408	24.0	3484	42.4	.250	265.32	311.56	207	255
PF-518	87.7	2934	9492	2278	2551	25.5	3691	45.0	.251	281.31	330.44	218	270
PF-519	92.6	3099	10025	2406	2695	27.0	3898	47 6	.251	297.30	349.32	230	280
PF-520	97.4	3265	10563	2535	2839	28.5	4105	50.2	.252	313.29	368.20	241	298
PF-521	102.5	3430	11096	2663	2983	30.0	4312	52.8	.252	329.28	387.08	253	312

- Suffix "S" indicates steam boiler, "W" indicates water boiler. Suffix "G" indicates gas-fired, "O" oil fired and "GO" for combination gas-oil fired.
- 2. I = B = R net ratings shown are based on piping and pick up allowances which vary from 1.333 to 1.288 for steam and 1.15 for water.
- Net ratings for water, square feet, are based on 170°F average water temperature in system.
 - For higher water temperatures, select boiler on basis of I=B=R Net Ratings. MBH.
- The I=B=R burner capacity in GPH is based on oil having a heat value of 140,000 BTU per gallon.

NOTE: Water Working Pressure— Steam 15 PSI W P Water 50 PSI W P Water (Optional) 70 PSI W.P

- 5 Boiler ratings are based on 121/4% CO2, +.10" water column pressure at boiler flue outlet.
 - $I\!=\!B\!=\!R$ vent diameter for Boiler No. PF-504 thru PF-508 is 10", for PF-509 PF-515 is 14" and for PF-516 PF-521 is 18"
 - Consult manufacturer for installations having unusual piping and pick up requirements, such as intermittent system operation, extensive piping systems, etc.

Ratings shown above apply at altitudes up to 1000 feet on oil and 2000 feet on gas. For altitudes above those indicated, the ratings should be reduced at the rate of 4% for each 1000 feet above sea level.



Form No. 4256-B-6/93-20Mf Printed in U.S.A. € 1990 Burnham Corporation, Lancaster, PA

APPENDIX C BUILDING LOAD BACK-UP CALCULATIONS

#1400,003

BUILDING ENERGY ANALYSIS PROGRAM

DEVELOPED BY
LAWRENCE BERKELEY LABORATORY/UNIVERSITY OF CALIFORNIA
AND
James J. Hirsch/HIRSCH & ASSOCIATES/(805) 482-5515

WITH MAJOR SUPPORT FROM
UNITED STATES DEPARTMENT OF ENERGY
ASSISTANT SECRETARY FOR CONSERVATION AND RENEWABLE ENERGY
OFFICE OF BUILDINGS AND COMMUNITY SYSTEMS
BUILDING SYSTEMS DIVISION

TI GREET WHOLL SPACE OF TOF

THIS PROGRAM WAS PREPARED AS AN ACCOUNT OF WORK SPONSORED BY THE UNITED STATES GOVERNMENT AND OTHERS. NEITHER THE UNITED STATES NOR THE DEPARTMENT OF EMERGY, NOR JAMES J. HIRSCH, NOR OTHER SPONSORS, NOR ANY OF THEIR EMPLOYEES, NOR ANY OF THEIR CONTRACTORS, SUBCONTRACTORS, OR THEIR EMPLOYEES MAKES ANY WARRANTY, EXPRESS OR IMPLIED, OR ASSUMES ANY LEGAL LIABILITY OR RESPONSIBILITY FOR THE ACCURACY, COMPLETENESS OR USEFULNESS OF ANY DATA OR RESULTS PRESENTED, APPARATUS, INFORMATION, PRODUCT OR PROCESS DISCLOSED, OR REPRESENTS THAT ITS USE WOULD NOT INFRINGE PRIVATELY OWNED RIGHTS.

LBL RELEASE DEC 1990 version : JJHirsch PC 2.1D-017
Elite Software PC DOE-2.1D released in April 1993.
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EMC ENGINEERS INC. EZDOE - ELITE SOFTWARE DEVELOPMENT INC DOE-2.1D 11/28/1995 9:24:10 LDL RUN 1
DENVER, CO 80227
REPORT- LV-A GENERAL PROJECT AND BUILDING INPUT BIG DELTA, AK

PERIOD OF STUDY STARTING DATE ENDING DATE NUMBER OF DAYS 1 JAN 1995 31 DEC 1995 365

1 JAN 1995 31 DEC 1995 SITE CHARACTERISTIC DATA

SITE CHARACTERISTIC DATA

STATION LATITUDE LONGITUDE ALTITUDE TIME AZIMUTH (DEG)

BIG DELTA, AK 64.5 145.6 0. 9 AST 0.0

DENVER,	GINEERS CO MMARY OF	INC 8022 SPACES	7	ZDOE - EI	LITE SOFTWA	ARE DEVELO	PMENT INC	DOE-2.1D 1	1/28/1995 A K	9:24:10 LDL RUN 1
NUMBER OF SPACES	6	E	XTERIOR	. 6	INTERIOR	0				
SPACE	SPACE MULT	SPACE TYPE	AZIMUTH	LIGHTING (WATT / SQFT)	PEOPLE	EQUIP (WATT / SQFT)	INFILTRATION METHOD	AIR CHANGES PER HOUR	AREA (SQFT)	VOLUME (CUFT)
INTERIOR C EXTER ZN C KITCHEN GYM ADJ TO GYM DINEMP	1.0 1.0 1.0 1.0	EXT EXT EXT EXT EXT EXT	0.0 0.0 0.0 0.0 0.0	0.75 1.00 0.70 0.50 0.60 0.75	150.0 150.0 5.0 75.0 35.0 150.0	0.00 0.00 0.00 0.00 0.00	AIR-CHANGE AIR-CHANGE AIR-CHANGE AIR-CHANGE AIR-CHANGE AIR-CHANGE	1.00 1.00 1.00 1.00 1.00	20342.00 8829.00 910.00 8150.00 7097.00 4900.00	183078.00 79461.00 8190.00 203750.00 63873.00 98000.00
BUILDING TOTALS					565.0				50228.00	636352.00

EMC ENGINEERS DENVER, CO REPORT- LV-C DETAILS OF SP.	INC. EZDOE - 80227 ACE	ELITE SOFTWAR	E DEVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:24:10 LDL RUN 1
DATA FOR SPACE INTERIOR	_c				
LOCATION OF ORIGIN IN BUILDING COORDINATES	SPACE				
LOCATION OF ORIGIN IN BUILDING COORDINATES XB (FT) YB (FT) ZB (FT) 0.00 0.00 0.00	AZIMUTH (DEG) 0.00	SPACE MULTIPLIER 1.0	HEIGHT (FT) 9.00	AREA (SQFT) 20342.00	VOLUME (CUFT) 183078.00
TOTAL NUMBER OF NUMBER OF SURFACES SURFACES 1	NUMBER OF NUMBER INTERIOR UNDERGISTICS SURFACES SURFACES	ER OF ROUND FACES 1	DAYLIGHTING SUNSPAC	E	
NUMBER OF SUBSURFACES EXTERIOR TOTAL WINDOWS DOORS 0 0 0	INTERIOR WINDOWS 0				
FLOOR WEIGHT (LB/SQFT) 70.0	CALCULATION TEMPERATURE (F) 70.0				
INFILTRATION SCHEDULE	INFILTRATION CALCULATION METHOD AIR-CHANGE	FLOW RATE (CFM/SQFT)	AIR CHANGES PER HOUR 1.00	HEIGHT TO NEUTRAL ZONE (FT)	
INFL_ACTIV PEOPLE	AIR-CHANGE				
		AREA PER PERSON	PEOPLE ACTIVITY (BTU/HR) 0.0	PEOPLE SENSIBLE (BTU/HR) 230.0	PEOPLE LATENT
SCHEDULE OCCUP	NUMBER 150.0	(SQFT) 135.6	(BTU/HR) 0.0	(BTU/HR) 230.0	LATENT (BTU/HR) 190.0
EMC ENGINEERS DENVER, CO REPORT- LV-C DETAILS OF SPA	ACE	ELITE SOFTWAR	E DEVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:24:10 LDL RUN 1
LIGHTING		LOAD		FRACTION	
schedule light_on	LIGHTING TYPE REC-FLUOR-RV	(WATTS/ SQFT) 0.75	LOAD (KW) 0.00	FRACTION OF LOAD TO SPACE 1.00	
INTERIOR SURFACES (U-VALUE		MS)	U-VALUE		
SURFACE (S	AREA SOFT) CONSTRUCT 000.00 ORESWALL 000.00 ORESWALL	'ION (BTU/	HR-SOFT-F) ADJACE 20.000 EXTER 20.000 DIN&MP	VT SPACE SURFACE-TYPE ZN_C QUICK AIR QUICK AIR	3
EXTERIOR SURFACES (U-VALUE		FILM)		II WALIFF	
SURFACE MULTI	PLIER (SOFT) 1.0 20449.00	WIDTH HI (FT) 143.00 14	EIGHT (FT) CONSTRUCT 43.00 ROOFCON	FION (BTU/HR-SOFT-F) 0.075	SURFACE TYPE QUICK
		LOCATION OF BUILDING CO	ORIGIN IN ORDINATES	LOCATION OF ORIGIN	IN
SURFACE	(DEG) (DEG) 0.0 0.0	XB (FT) YI 0.00	DRDINATES B (FT) ZB (FT) 0.00 0.00	X (FT) Y (FT) 0.00 0.00	Z (FT)
UNDERGROUND SURFACES (U-VAL	UE INCLUDES INSIDE AI	R FILM)		0.00	0.00
SURFACE MULTI	UE INCLUDES INSIDE AI AREA PLIER (SQFT) 1.0 20449.00	CONSTRUCTION FLOORCON	U-VALUE (BTU/HR-SQFT-F) 0.10		

DENVER,	CO 8	0227	EZDOE - E	LITE SOFT	VARE DEVELOPM	ENT INC	DOE-2.1D 11/	20/1995	3.21.10	DDD RON
EPORT- LV-C DETA	ILS OF SPACE				EXTER_ZN_C		BIG DELTA, AK			
ATA FOR SPACE										
OCATION OF ORIGI	n in Tes	SPACE						_		
OCATION OF ORIGI WILDING COORDINA XB (FT) YB (FT) 0.00 0.00	ZB (FT) 0.00	AZIMUTH (DEG) 0.00		MULTIPLIE 1	CE ER . 0	HEIGHT (FT) 9.00	ARE (SOFT 8829.0	A) 0	VOLUM (CUFT 79461.0) 0
TOTAL NU NUMBER E ST SURFACES S	MBER OF NO XTERIOR : URFACES :	UMBER OF INTERIOR SURFACES 1	NUMBER UNDERGRO SURFA	OF UND CES 1	DAYLIGHTI	NG SUNSPACE NO NO				
TUMBER OF SUBSURF EXTERIOR TOTAL WINDOWS 4 4	ACES	NTERIOR WINDOWS 0								
LOOR WEIGHT (LB/SQFT) 70.0		CALCULATION TEMPERATURE (F) 70.0								
NFILTRATION		ארב דיים אידי ברו		FLOW RAT	TE AI	R CHANGES PER HOUR 1.00	HEIGHT T NEUTRAL ZON (FT 0.	O E) 0		
EOPLE				AREA PE	ER.	PEOPLE	PEOPL	E	PEOPL	Æ
SCHEDULE OCCUP		NUMBER 150.0		PERSO (SQFT))	ACTIVITY (BTU/HR)	PEOPL SENSIBL (BTU/H 230.	E R)	LATEN (BTU/ 190.	T HR) 0
										LDL RUN
EMC ENG DENVER, EPORT- LV-C DETA										LDL RUN
	INEERS 1 CO 80 ILS OF SPACE	INC. 1	EZDOE - E	LITE SOFTW	ARE DEVELOPME	ENT INC	DOE-2.1D 11/ BIG DELTA, AK	28/1995 		LDL RUN
EMC ENG DENVER, EPORT- LV-C DETA	INEERS 1 CO 80 ILS OF SPACE		EZDOE - E	LITE SOFTW	ARE DEVELOPME		DOE-2.1D 11/ BIG DELTA, AK	28/1995 N D D E		LDL RUN
EMC ENG DENVER, EPORT- LV-C DETA IGHTING SCHEDULE LIGHT_ON	INTERS 80 CO STACE	LIGHTING TYPE REC-FLUO	EZDOE - E:	LOX (WATTS SQFT 1.0	EXTER_ZN_C AD O	LOAD (KW) 0.00	DOE-2.1D 11/ BIG DELTA, AK FRACTIO OF LOA TO SPAC 1.0	28/1995 N D D E		LDL RUN
EMC ENG DENVER, DENVER DETA DETA DETA DETA DETA DETA DETA DETA	INTERS 80 CO STACE	LIGHTING TYPE REC-FLUO	EZDOE - E:	LOX (WATTS SQFT 1.0	EXTER_ZN_C AD O	LOAD (KW) 0.00	DOE-2.1D 11/ BIG DELTA, AK FRACTIO OF LOA TO SPAC 1.0	28/1995 N D E O		LDL RUN
EMC ENG DENVER, DENVER, SPORT LV-C DETA GHTING SCHEDULE LIGHT_ON THER EQUIPMENT SCHEDULE DHW_CLASS	INEERS 80 ILS OF SPACE	LIGHTING TYPE REC-FLUOI SOURCE TYPE HOT-WATEI	EZDOE - E: R-RV	LOF (WATTS SQFT 1.0 BTU/HR) 45000.	EXTER_ZN_C AD O	LOAD (KW) 0.00 FRACTION OF SIBLE 0.00	DOE-2.1D 11/ BIG DELTA, AK FRACTIO OF LOA TO SPAC 1.0	28/1995 N D E O		LDL RUN
EMC ENG DENVER, EPORT - LV-C DETA IGHTING SCHEDULE LIGHT_ON ITHER EQUIPMENT SCHEDULE DHW_CLASS	INTERS 80 CO 80 ILS OF SPACE	LIGHTING TYPE REC-FLUOI SOURCE TYPE HOT-WATEI	EZDOE - E: R-RV R AIR FILM:	LOP (WATTS SOFT 1.0 BTU/HR) 45000.	ARE DEVELOPME EXTER ZN C AD O AD O U-VALUE	LOAD (KW) 0.00 FRACTION OF SIBLE 0.00	DOE-2.1D 11/ BIG DELTA, AK FRACTIO OF LOA TO SPAC 1.0	28/1995 N D E O O	9:24:10	LDL RUN
EMC ENG DENVER, EPORT- LV-C DETA IGHTING SCHEDULE LIGHT_ON THER EQUIPMENT SCHEDULE DHW_CLASS NTERIOR SURFACES SURFACE	INEERS 8 ILS OF SPACE (U-VALUE INC AF (SOF)	LIGHTING TYPE REC-FLUOI SOURCE TYPE HOT-WATEI CLUDES BOTH REA REA C.00 01	EZDOE - E: R-RV R AIR FILM: RESWALL IDE AIR F F	LOFTW (WATTS SOFT 1.0 BTU/HR) 45000. S)	WARE DEVELOPME EXTER_ZN_C AD O U-VALUE TU/HR-SOFT-F) 20.000	LOAD (KW) 0.00 FRACTION OF SIBLE 0.00 ADJACEN INTERIO	DOE-2.1D 11/ BIG DELTA, AK FRACTIO OF LOA TO SPAC 1.0 LOAD TO SPACE LATENT 0.1 T SPACE SUR C QU	28/1995 N D E O O C RPACE-TYPE ICK AIR	9:24:10	LDL RUN
EMC ENG DENVER, DENVER, EPORT- LV-C DETA IGHTING SCHEDULE LIGHT_ON THER EQUIPMENT SCHEDULE DHW_CLASS NTERIOR SURFACES	(U-VALUE INC (SOF) (U-VALUE EXC (U-VALUE EXC MULTIPL)	LIGHTING TYPE REC-FLUOI SOURCE TYPE HOT-WATER CLUDES BOTH REA F) CC 1.0 88.1.0 88.1.0 23.1.0 23.1.0 24.1.0 32.1.0 24.1.0 32.1.0 24.1.0 32.1.	EZDOE - E: R-RV R AIR FILM: RESWALL IDE AIR F F	LOFTW (WATTS SOFT 1.0 BTU/HR) 45000. S)	WARE DEVELOPME EXTER_ZN_C AD O U-VALUE TU/HR-SOFT-F) 20.000	LOAD (KW) 0.00 FRACTION OF SIBLE 0.00 ADJACEN INTERIO	DOE-2.1D 11/ BIG DELTA, AK FRACTIO OF LOA TO SPAC 1.0 LOAD TO SPACE LATENT 0.1 T SPACE SUR C QU	28/1995 N D E O O C RPACE-TYPE ICK AIR	9:24:10	LDL RUN
EMC ENG DENVER, DENVER, DENVER, DENVER, DENVER, DENVER, SCHEDULE LIGHT_ON THER EQUIPMENT SCHEDULE DHW_CLASS NTERIOR SURFACES SURFACE XTERIOR SURFACES	(U-VALUE INC (SOF) (U-VALUE EXC (U-VALUE EXC MULTIPL)	LIGHTING TYPE REC-FLUOI SOURCE TYPE HOT-WATER CLUDES BOTH REA F) CC 1.0 88.1.0 88.1.0 23.1.0 23.1.0 24.1.0 32.1.0 24.1.0 32.1.0 24.1.0 32.1.	R-RV RAIR FILM: ONSTRUCTION RESWALL IDE AIR F: AREA OFT) 36.00 04.00 39.00 94.00	LITE SOFTW LOZ (WATTS SOFT 1.0 BTU/HR) 45000. S) ON (BT (FT) 94.00 271.00 271.00 366.00 181.00	WARE DEVELOPME EXTER_ZN_C AD O U-VALUE TU/HR-SOFT-F) 20.000	LOAD (KW) 0.00 FRACTION OF: SIBLE 0.00 ADJACEN INTERIO: CONSTRUCT ROOFCON WALL CON WALL CON WALL CON WALL CON WALL CON	DOE-2.1D 11/ BIG DELTA, AK FRACTIO OF LOA TO SPAC 1.0 LOAD TO SPACE LATENT 0.1 T SPACE SUR C QU	0 RFACE-TYPE ICK AIR -VALUE R-SOFT-F) 0.180 0.180 0.180 0.180	9:24:10 9:24:10 SURFACE TYPE QUICK QUICK QUICK QUICK QUICK	LDL RUN

EMC ENGINEER DENVER, CO EPORT- LV-C DETAILS O	S INC. EZDO 80227 F SPACE	E - ELITE SOFTWARE DI EXTE	EVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:24:10 LDL RUN 1
NDERGROUND SURFACES (U-VALUE INCLUDES INSID				
	AREA MULTIPLIER (SQFT) 1.0 8836.00	CONSTRUCTION FLOORCON	U-VALUE (BTU/HR-SQFT-F) 0.10		4
XTERIOR WINDOWS				cvv	CHOLDE
WINDOW	MULTIPLIER (SOFT 43.0 21.0 25.0 21.0 57.0 21.0 23.0 21.0	A SHADING OF	TYPE BACK WIDTINDEX (FT) (FT) (FT) (FT) (FT) (FT) (FT) (FT)	SKY TH HEIGHT FORM T) (FT) FACTOR 00 3.00 00 3.00 00 3.00 00 3.00	FORM FACTOR
		LOCATION OF ORI	GIN IN NATES	LOCATION OF ORIGIN SURFACE COORDINATE	I IN ES
WINDOW	LOCATED IN SURFACE	XB (FT) YB (F 0.00 0 0.00 0 0.00 0 0.00 0	T) ZB (FT) 00 0.00 00 0.00 00 0.00 00 0.00		
EMC ENGINEERS	S INC. EZDO:	E - ELITE SOFTWARE DE	VELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:24:10 LDL RUN 3
EPORT- LV-C DETAILS OF	F SPACE	KITCH	EN	BIG DELTA, AK	
ATA FOR SPACE KITCH					
OCATION OF ORIGIN IN JILDING COORDINATES	SPACE AZIMUTH	SDACE	UPICUM	AREA	TACT TWEE
CB (FT) YB (FT) ZB 0.00 ((FT) (DEG) 0.00 0.00	SPACE MULTIPLIER 1.0	(FT) 9.00	AREA (SQFT) 910.00	VOLUME (CUFT) 8190.00
TOTAL NUMBER OF SURFACES SURFACES		IMBER OF ERGROUND SURFACES DAY	LIGHTING SUNSPAC NO NO	CE	
MBER OF SUBSURFACES EXTERIOR OTAL WINDOWS DOX 0 0		-		,	
LOOR WEIGHT (LB/SQFT) 70.0	CALCULATION TEMPERATURE (F) 70.0				
FILTRATION SCHEDULE	INFILTRATION CALCULATION METHOD	FLOW RATE (CFM/SQFT)	AIR CHANGES PER HOUR 1.00	HEIGHT TO NEUTRAL ZONE (FT)	4
INFL_ACTIV	METHOD AIR-CHANGE	0.00	1.00	(FT) 0.0	•
SCHEDULE OCCUP	NUMBER 5.0	AREA PER PERSON (SQFT) 182.0	PEOPLE ACTIVITY (BTU/HR) 0.0	PEOPLE SENSIBLE (BTU/HR) 230.0	PEOPLE LATENT (BTU/HR) 190.0
EMC ENGINEERS DENVER, CO PORT- LV-C DETAILS OF	INC. EZDOE 80227 SPACE	- ELITE SOFTWARE DE KITCH	VELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:24:10 LDL RUN 1
GHTING		LOAD		FRACTION	
SCHEDULE LIGHT_ON HER EOUIPMENT	LIGHTING TYPE REC-FLUOR-RV	(WATTS/ SQFT) 0.70	LOAD (KW) 0.00	OF LOAD TO SPACE 1.00	
SCHEDULE DHW_CAFE	SOURCE TYPE HOT-WATER	LOAD (BTU/HR) 297500.0	FRACTION OF SENSIBLE 0.10	LOAD TO SPACE	
-	LUE INCLUDES BOTH AIR	FILMS)		0.20	
SURFACE	AREA (SQFT) CONSTR 2000.00 ORESWA	UCTION (BTU/HR-S	-VALUE DFT-F) ADJACE 20.000 DIN&MP	NT SPACE SURFACE-TYPE QUICK AIR	3
TERIOR SURFACES (U-VA	LUE EXCLUDES OUTSIDE A	IR FILM)		II VALUE	
SURFACE M	ULTIPLIER (SOFT) 1.0 1050.00 1.0 150.00	WIDTH HEIGHT (FT) (FT) 15.00 70.00 15.00 10.00	CONSTRUCT ROOFCON	U-VALUE FION (BTU/HR-SQFT-F) 0.075 0.180	SURFACE TYPE QUICK QUICK
SURFACE	AZIMUTH TILT (DEG) (DEG) 0.0 0.0 0.0	LOCATION OF ORIC BUILDING COORDIN XB (FT) YB (FT 0.00 0.0	EIN IN MATES ') ZB (FT) 00 0.00	LOCATION OF ORIGIN SPACE COORDINATES X (FT) Y (FT) 0.00 0.00 0.00 0.00	=
	-VALUE INCLUDES INSIDE AREA	AIR FILM)	U-VALUE		
SURFACE M	ULTIPLIER (SOFT) 1.0 1050.00	CONSTRUCTION (E FLOORCON	TU/HR-SQFT-F) 0.10		

REPORT- LV-C DETAILS OF S	INC. EZDOE - 80227 SPACE	· ELITE SOFTWARE DEVI	ELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:24:10 LDL RUN 1
DATA FOR SPACE GYM					
LOCATION OF ORIGIN IN BUILDING COORDINATES	SPACE				
XB (FT) YB (FT) ZB (FT 0.00 0.00	AZIMUTH (DEG) 00 0.00	SPACE MULTIPLIER 1.0	HEIGHT (FT) 25.00	AREA (SOFT) 8150.00	VOLUME (CUFT) 203750.00
TOTAL NUMBER OF NUMBER OF EXTERIOR SURFACES SURFACES 4	NUMBER OF NUME INTERIOR UNDERC SURFACES SUF 1	BER OF BROUND RFACES DAYLI 1	IGHTING SUNSPACE NO NO		
NUMBER OF SUBSURFACES EXTERIOR FOTAL WINDOWS DOORS 0 0 0					
PLOOR WEIGHT (LB/SQFT) 70.0	CALCULATION TEMPERATURE (F) 70.0				
NFILTRATION	INFILTRATION CALCULATION	FLOW RATE	AID CUANCES	HEIGHT TO NEUTRAL ZONE	
SCHEDULE GYM_INFL	METHOD AIR-CHANGE	(CFM/SOFT) 0.00	AIR CHANGES PER HOUR 1.00	(FT) 0.0	
EOPLE		ADEA DED	PEOPLE		
SCHEDULE OCCUP	NUMBER 75.0	AREA PER PERSON (SOFT) 108.7	ACTIVITY (BTU/HR)	PEOPLE SENSIBLE (BTU/HR) 400.0	PEOPLE LATENT (BTU/HR) 800.0
EMC ENGINEERS DENVER, CO EPORT- LV-C DETAILS OF S.	80227 PACE	GYM	COPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:24:10 LDL RUN 1
SCHEDULE GYM_LIGHT	LIGHTING TYPE REC-FLUOR-RV	LOAD (WATTS/ SQFT) 0.50	LOAD (KW) 0.00	FRACTION OF LOAD TO SPACE 1.00	
NTERIOR SURFACES (U-VALU			ALUE		
SURFACE	AREA (SQFT) CONSTRUC 2000.00 ORESWALL	U-V TION (BTU/HR-SOF 20	T-F) ADJACENT	SPACE SURFACE-TYPE	
SURFACE	AREA (SQFT) CONSTRUC 2000.00 ORESWALL E EXCLUDES OUTSIDE AIR	U-V. TION (BTU/HR-SOF 20 FILM)		SPACE SURPACE-TYPE SYM QUICK AIR U-VALUE	
SURFACE :	AREA (SQFT) CONSTRUC 2000.00 ORESWALL	U-V TION (BTU/HR-SOF 20	T-F) ADJACENT .000 ADJ_TO_G CONSTRUCTI ROOFCON WALL CON	U-VALUE	SURFACE TYPE QUICK QUICK QUICK QUICK QUICK
SURFACE Z XTERIOR SURFACES (U-VALUI SURFACE MULT	AREA (SOFT) CONSTRUC 2000.00 ORESWALL E EXCLUDES OUTSIDE AIR TIPLIER (SOFT) 1.0 6935.00 1.0 2500.00 1.0 100.00 1.0 1640.00	U-V. TION (BTU/HR-SOF 20 FILM) WIDTH HEIGHT (FT) (FT) 73.00 95.00	T-F) ADJACENT .000 ADJ_TO_G CONSTRUCTI ROOFCON WALL CON WALL_CON WALL_CON	U-VALUE ON (BTU/HR-SOFT-F) 0.075 0.180 0.180	SURFACE TYPE QUICK QUICK QUICK QUICK
SURFACE Z XTERIOR SURFACES (U-VALUI SURFACE MULT	AREA (SOFT) CONSTRUC 2000.00 ORESWALL E EXCLUDES OUTSIDE AIR TIPLIER (SOFT) 1.0 6935.00 1.0 2500.00	U-V. TION (BTU/HR-SOF 20 FILM) WIDTH HEIGHT (FT) 73.00 95.00 100.00 25.00 20.00 82.00 20.00 LOCATION OF ORIGIN BUILDING COORDINA: XB (FT) YB (FT) XB (FT) YB (FT) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	T-F) ADJACENT .000 ADJ_TO_G CONSTRUCTI ROOFCON WALL CON WALL_CON WALL_CON N IN TES ZB (FT) 0.00 0.00 0.00	U-VALUE ON (BTU/HR-SOFT-F)	SURFACE TYPE QUICK QUICK QUICK QUICK IN Z (FT) 0.00 0.00 0.00
SURFACE : XTERIOR SURFACES (U-VALUI SURFACE MULT	AREA (SOFT) CONSTRUC 2000.00 ORESWALL E EXCLUDES OUTSIDE AIR TIPLIER (SOFT) 1.0 6935.00 1.0 2500.00 1.0 100.00 1.0 1640.00 AZIMUTH TILT (DEG) (DEG) 0.0 0.0 0.0 90.0 180.0 90.0 270.0 90.0	TION (BTU/HR-SOF 20 FILM) WIDTH HEIGHT (FT) (FT) 73.00 95.00 100.00 25.00 82.00 20.00 B2.00 20.00 LOCATION OF ORIGIN BUILDING COORDINA: XB (FT) YB (FT) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	T-F) ADJACENT .000 ADJ_TO_G CONSTRUCTI ROOFCON WALL CON WALL_CON WALL_CON N IN TES ZB (FT) 0.00 0.00 0.00	U-VALUE ON (BTU/HR-SOFT-F) 0 075 0 180 0 180 0 180 0 180 COATION OF ORIGIN SPACE COORDINATES X (FT) Y (FT) 0 000 0 000	SURFACE TYPE QUICK QUICK QUICK QUICK IN Z (FT) 0.00

EMC ENGINEER DENVER, CO PORT- LV-C DETAILS O	S INC. 80227 F SPACE	EZDOE - ELITE SOFTWAF	RE DEVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:24:10 LDL RUN 1
ATA FOR SPACE ADJ_	TO_GYM				
CATION OF ORIGIN IN ULDING COORDINATES	SPAC	E SDACE	urtgu	T APEA	VOLUME
	(FT) (DEG 0.00 0.0	H SPACE) MULTIPLIER 0 1.0	(FT 9.0	T AREA) (SQFT) 0 7097.00	VOLUME (CUFT) 63873.00
TOTAL NUMBER NUMBER EXTERI SURFACES SURFAC	OF NUMBER OF OR INTERIOR ES SURFACES 5 1	NUMBER OF UNDERGROUND SURFACES 1	DAYLIGHTING SU	NSPACE NO	
IMBER OF SUBSURFACES EXTERIOR DTAL WINDOWS DO 0 0					
OOR WEIGHT (LB/SQFT) 70.0		E			
FILTRATION	INFILTRATIO	N		HEIGHT TO	
SCHEDULE GYM_INFL	CALCULATION METHOD AIR-CHANGE	FLOW RATE	AIR CHANGE PER HOU 1.0	S NEUTRAL ZONE R (FT) 0 0.0	
COPLE		AREA PER PERSON	ייי דעדידיי אַ	E PEOPLE Y SENSIBLE	PEOPLE LATENT
SCHEDULE OCCUP	NUMBE 35.	R (SQFT)	(BTU/HR 0.	Y SENSIBLE (BTU/HR) 0 400.0	LATENT (BTU/HR) 800.0
	80227 DF SPACE		ADJ_TO_GYM	DOE-2.1D 11/28/1995 BIG DELTA, AK	
IGHTING SCHEDULE	LIGHTIN TYPE	LOAD (G (WATTS/ SQFT) (OR-RV 0.60	LOA (KW) TO SPACE	
LIGHT_ON THER EQUIPMENT	ŘĚC-FLU	OR-RV 0.60			
-	SOURCE TYPE HOT-WAT	LOAD		ON OF LOAD TO SPACE	
SCHEDULE DHW_GYM	1101 1111		0.0	0.10	
NTERIOR SURFACES (U-\	3003		U-VALUE		
SURFACE	(SOFT) 2000.00	CONSTRUCTION (BTU ORESWALL	/HR-SOFT-F) A 20.000 G	DJACENT SPACE SURFACE-T YM QUICK A	TYPE AIR
TERIOR SURFACES (U-V	ALUE EXCLUDES OUT		UDI CUT	U-VALUE	SURFACE
SURFACE	1.0	AREA WIDTH (FT) (FT) (FT) (935.00 73.00 58.00 868.50 96.50 350.00 150.00 135.00	(PT) CON	ISTRUCTION	F) TVDF
		LOCATION O	F ORIGIN IN COORDINATES	LOCATION OF ORIGINATE	GIN IN CS
SURFACE	(DEG) (DE 0.0 (DE 0.0 90 90.0 90 180.0 90	LT	YB (FT) ZB (FT) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	X (FT) Y (FT) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00
EMC ENGINEE DENVER, CO EPORT- LV-C DETAILS	80227	EZDOE - ELITE SOFTWA	RE DEVELOPMENT INC	DOE-2.1D 11/28/1999 BIG DELTA, AK	5 9:24:10 LDL RUN
NDERGROUND SURFACES	(U-VALUE INCLUDES		U-VALUE	E	
	MULTIPLIER (S	CONSTRUCTION FLOORCON			

DENVER,	INEERS INC. CO 80227 ILS OF SPACE	EZDOE - E	LITE SOFTWAR D	E DEVELOPMEN IN&MP	TT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:24:10 LDL RUN 1
EPORI- BV-C DEIA							
DATA FOR SPACE	DIN&MP						
LOCATION OF ORIGINATION OF COORDINATION OF COO	n in Tes spi	ACE	an. an		IIDTOUR.	ADEA	VOLUME
XB (FT) YB (FT) 0.00	ZB (FT) (D) 0.00 0		SPACE MULTIPLIER 1.0		HEIGHT (FT) 20.00	AREA (SQFT) 4900.00	(CUFT) 98000.00
TOTAL NU NUMBER E OF SURFACES S 6	MBER OF NUMBER OF XTERIOR INTERIOR URFACES SURFACES 2	NUMBER UNDERGRO SURFA	OF UND CES 1	DAYLIGHTING NO	S SUNSPACE		
NUMBER OF SUBSURF EXTERIOR FOTAL WINDOWS 0 0	INTERIOR						
FLOOR WEIGHT (LB/SQFT) 70.0	CALCULAT TEMPERATI (F	TR F.					
INFILTRATION SCHEDULE	INFILTRAT CALCULATION METHOD	NC	FLOW RATE	AIR F	CHANGES PER HOUR	HEIGHT TO NEUTRAL ZONE (FT)	
INFL_ACTIV	AIR-CHANG	Ε	0.00		1.00	0.0	
PEOPLE			AREA PER PERSON (SQFT) 32.7		PEOPLE	PEOPLE SENSIBLE	PEOPLE LATENT (BTU/HR)
SCHEDULE OCCUP	NUM	BER 0.0	(SQFT)	P.	PEOPLE ACTIVITY (BTU/HR) 0.0	(BTU/HR) 0.0	(BTU/HR)
							0 04 10 TDT BUN
EMC ENG DENVER, LEPORT- LV-C DETA	INEERS INC. CO 80227 ILS OF SPACE	EZDOE - E	LITE SOFTWAR	E DEVELOPMEN	VT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:24:10 LDL RUN
EMC ENG DENVER, REPORT- LV-C DETA	INEERS INC. CO 80227 ILS OF SPACE	EZDOE - E		E DEVELOPMEN	NT INC		9:24:10 LDL RUN
	LIGHT	EZDOE - E EZDOE - E ING LUOR-RV	LOAD (WATTS) SQFT 0.75	E DEVELOPMEN IN&MP	LOAD (KW) 0.00	DOE-2.1D 11/28/1995 BIG DELTA, AK FRACTION OF LOAD TO SPACE 1.00	9:24:10 LDL RUN
LIGHTING SCHEDULE LIGHT_ON	LIGHT	ING LUOR-RV	LOAD (WATTS/ SQFT) 0.75	E DEVELOPMEN IN&MP U-VALUE	LOAD (KW)	FRACTION OF LOAD TO SPACE	9:24:10 LDL RUN
LIGHTING SCHEDULE LIGHT_ON	LIGHT TYPE REC-F: (U-VALUE INCLUDES B	ING LUOR-RV	LOAD (WATTS/ SQFT) 0.75	u-value	LOAD (KW)	FRACTION OF LOAD TO SPACE 1.00	
SCHEDULE LIGHT_ON INTERIOR SURFACES SURFACE	LIGHT TYPE REC-F: (U-VALUE INCLUDES B AREA (SOFT) 2000.00	ING LUOR-RV OTH AIR FILM CONSTRUCTI ORESWALL ORESWALL	LOAD (WATTS/ SQFT) 0.75 S) ON (BTU/	U-VALUE HR-SOFT-F) 20.000 20.000	LOAD (KW) 0.00	FRACTION OF LOAD TO SPACE 1.00 SPACE SURFACE-TYPE C QUICK AIR QUICK AIR	
SCHEDULE LIGHT_ON INTERIOR SURFACES SURFACE	LIGHT TYPE REC-F: (U-VALUE INCLUDES B: (SOFT) 2000.00 2000.00 (U-VALUE EXCLUDES O	ING LUOR-RV OTH AIR FILM CONSTRUCTI ORESWALL ORESWALL UTSIDE AIR F	LOAD (WATTS/ SQFT) 0.75 S) ON (BTU/	u-value	LOAD (KW) 0.00	FRACTION OF LOAD TO SPACE 1.00 SPACE 1.00 SPACE 1.00 UVALUE SPACE UVALUE SPACE SPACE SURFACE-TYPE UVALUE SPACE SPACE SURFACE-TYPE SPACE SURFACE-TYPE SPACE SURFACE-TYPE SPACE SURFACE-TYPE SPACE SURFACE-TYPE SPACE SURFACE-TYPE SPACE SPACE SPACE SURFACE-TYPE SPACE SURFACE-TYPE SPACE SPACE SPACE SURFACE-TYPE SPACE SPACE SURFACE-TYPE SURFACE-TYPE SPACE SURFACE-TYPE SPACE SURFACE-TYPE SURF	
SCHEDULE LIGHT_ON INTERIOR SURFACES SURFACE	LIGHT TYPE REC-F: (U-VALUE INCLUDES BE AREA (SOFT) 2000.00 2000.00 (U-VALUE EXCLUDES OF	ING LUOR-RV OTH AIR FILM CONSTRUCTI ORESWALL ORESWALL UTSIDE AREA (SOFT) 4900.00	LOAD (WATTS/ SQFT) 0.75 S) ON (BTU/ ILM) WIDTH H (FT) 70.00 70.00	U-VALUE HR-SQFT-F) 20.000 20.000 EIGHT (FT) 70.00 20.000	LOAD (KW) 0.00 ADJACENT INTERIOR KITCHEN CONSTRUCTI ROOFCON WALL CON WALL_CON	FRACTION OF LOAD TO SPACE 1.00 SPACE 1.00 SPACE 1.00 UVALUE ON SPACE SURFACE-TYPE QUICK AIR U-VALUE ON SPACE SURFACE-TYPE OUTCK AIR U-VALUE ON SPACE ON	SURFACE TYPE QUICK QUICK QUICK
SCHEDULE LIGHT_ON INTERIOR SURFACES SURFACE	LIGHT TYPE REC-F: (U-VALUE INCLUDES BE (SOFT) 2000.00 2000.00 (U-VALUE EXCLUDES OF MULTIPLIER 1.0 1.0 1.0 AZIMUTH (DEG)	ING LUOR-RV OTH AIR FILM CONSTRUCTI ORESWALL ORESWALL UTSIDE AIR F AREA (SOFT) 4900.00 1400.00	LOAD (WATTS/ SQFT / 0.75 S) ON (BTU/ ILM) WIDTH H (FT) 70.00 70.00 70.00 LOCATION OF BUILDING CO	U-VALUE HR-SQFT-F) 20.000 20.000 EIGHT (FT) 70.00 20.00 20.00 CORIGIN IN ORDINATES	LOAD (KW) 0.00 ADJACENI INTERIOR KITCHEN CONSTRUCT! ROOFCON WALL CON WALL_CON	FRACTION OF LOAD TO SPACE 1.00 SPACE QUICK AIR QUICK AIR QUICK AIR OUTPRICE ON (BTU/HR-SQFT-F) 0.180 0.180 LOCATION OF ORIGIN SPACE COORDINATES	SURFACE TYPE QUICK QUICK QUICK UICK
SCHEDULE LIGHT_ON INTERIOR SURFACES SURFACE EXTERIOR SURFACES SURFACE SURFACE	LIGHT TYPE REC-F: (U-VALUE INCLUDES BE AREA (SOFT) 2000.00 2000.00 (U-VALUE EXCLUDES OF MULTIPLIER 1.0 1.0 1.0 AZIMUTH (DEG) 0.0 0.0 90.0	ING LUOR-RV OTH AIR FILM CONSTRUCTI ORESWALL ORESWALL UTSIDE AIR F 4900.00 1400.00 1400.00 TILT DEG) 0.0 90.0 90.0	LOAD (WATTS/SQFT) 0.75 S) ON (BTU/ ILM) WIDTH H (FT) 70.00 70.00 LOCATION OF BUILDING CO XB (FT) Y 0.00 0.00 0.00	U-VALUE HR-SOFT-F) 20.000 20.000 EIGHT (FT) 70.00 20.00 ORIGIN IN ORDINATES B (FT) ZB (0.00 0.00 0.00	LOAD (KW) 0.00 ADJACENT INTERIOR KITCHEN CONSTRUCTI ROOFCON WALL CON WALL CON WALL CON (FT) 0.00 0.00	FRACTION OF LOAD TO SPACE 1.00 SPACE 1.00 SPACE 1.00 UVALUE ON SPACE SURFACE-TYPE QUICK AIR U-VALUE ON SPACE SURFACE-TYPE OUTCK AIR U-VALUE ON SPACE ON	SURFACE TYPE QUICK QUICK QUICK UICK

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EMC ENGINEERS INC. EZDOE - ELITE SOFTWI
DENVER, CO 80227
REPORT- LV-G DETAILS OF SCHEDULES OCCURRING IN THE PROJECT
                      EZDOE - ELITE SOFTWARE DEVELOPMENT INC
                                               DOE-2.1D 11/28/1995
                                                             9:24:10 LDL RUN 1
                                               BIG DELTA, AK
                     ( NON DIMENSIONLESS SCHEDULES ARE GIVEN IN ENGLISH UNITS )
NUMBER OF SCHEDULES 10
  SCHEDULE FULL OFF
    THROUGH 31 12
      FOR DAYS SUN MON TUE WED THU FRI SAT HOL
     SCHEDULE OCCUP
    THROUGH 5 6
      FOR DAYS SUN SAT HOL
    FOR DAYS MON TUE WED THU FRI
    HOUR 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 0.00 0.00 0.00 0.00 0.00 0.00 0.10 1.00 1.00 1.00 0.80 0.30 1.00 1.00 0.30 0.10 0.10 0.40 0.40 0.40 0.20 0.00 0.00
    THROUGH 25 8
     THROUGH 31 12
     ENGINEERS INC. EZDOE - ELITE SOFTWI
R, CO 80227
-G DETAILS OF SCHEDULES OCCURRING IN THE PROJECT
                      EZDOE - ELITE SOFTWARE DEVELOPMENT INC
                                               DOE-2.1D 11/28/1995
                                                             9:24:10 LDL RUN 1
  EMC
DENVER
                                               BIG DELTA, AK
      FOR DAYS SUN SAT HOL
      FOR DAYS MON TUE WED THU FRI
    HOUR 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 0.00 0.00 0.00 0.00 0.00 0.00 0.10 1.00 1.00 1.00 0.80 0.30 1.00 1.00 0.30 0.10 0.10 0.10 0.40 0.40 0.20 0.00 0.00 0.00
  SCHEDULE LIGHT_ON
    THROUGH 5 6
      FOR DAYS SUN SAT HOL
      FOR DAYS MON TUE WED THU FRI
    THROUGH 25 8
      THROUGH 31 12
       ENGINEERS
                      EZDOE - ELITE SOFTWARE DEVELOPMENT INC
                                               DOE-2.1D 11/28/1995
                                                             9:24:10 LDL RUN 1
DENVER,
REPORT- LV-G DETAILS OF SCHEDULES OCCURRING IN THE PROJECT
                                               BIG DELTA, AK
    FOR DAYS SUN SAT HOL HOUR 1 2
      FOR DAYS MON TUE WED THU FRI
    SCHEDULE DHW_CLASS
    THROUGH 5 6
      FOR DAYS SUN SAT HOL
    FOR DAYS SUN MON TUE WED THU FRI SAT HOL
      THROUGH 31 12
```

9:24:10 LDL RUN 1 DOE-2.1D 11/28/1995 EZDOE - ELITE SOFTWARE DEVELOPMENT INC EMC ENGINEERS INC. EZDOE - ELITE SOFTWI DENVER, CO 80227 REPORT- LV-G DETAILS OF SCHEDULES OCCURRING IN THE PROJECT BIG DELTA, AK FOR DAYS SUN SAT HOL FOR DAYS MON TUE WED THU FRI SCHEDULE DHW_GYM THROUGH 5 6 FOR DAYS SUN SAT HOL FOR DAYS MON TUE WED THU FRI THROUGH 25 8 THROUGH 31 12 DOE-2.1D 11/28/1995 EZDOE - ELITE SOFTWARE DEVELOPMENT INC ENGINEERS INC. EMC ENGINEERS INC. EZDOE - ELITE SOFTWI DENVER CO 80227 REPORT- LV-G DETAILS OF SCHEDULES OCCURRING IN THE PROJECT BIG DELTA, AK FOR DAYS MON TUE WED THU FRI SCHEDULE DHW_CAFE THROUGH 5 6 FOR DAYS SUN SAT HOL FOR DAYS MON TUE WED THU FRI THROUGH 25 8 FOR DAYS SUN MON TUE WED THU FRI SAT HOL THROUGH 31 12 DOE-2.1D 11/28/1995 9:24:10 LDL RUN 1 EMC ENGINEERS INC. EZDOE - ELITE SOFTW)

REPORT- LV-G DETAILS OF SCHEDULES OCCURRING IN THE PROJECT EZDOE - ELITE SOFTWARE DEVELOPMENT INC BIG DELTA, AK FOR DAYS SUN SAT HOL FOR DAYS MON TUE WED THU FRI SCHEDULE GYM_LIGHT THROUGH 5 6

 $\begin{smallmatrix} \mathbf{R} & \mathbf{1} & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 & 13 & 14 & 15 & 16 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 \\ 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.10 & 0.10 & 0.20 & 0.20 & 0.20 & 0.50 & 0.10 & 0.10 & 0.0$

FOR DAYS SUN SAT HOL

THROUGH 25 8

FOR DAYS SUN MON TUE WED THU FRI SAT HOL

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EMC ENGINEERS INC. EZDOE - ELITE SOFTWA
DENVER, CO 80227
REPORT- LV-G DETAILS OF SCHEDULES OCCURRING IN THE PROJECT
         ENGINEERS
                             EZDOE - ELITE SOFTWARE DEVELOPMENT INC
                                                              DOE-2.1D 11/28/1995
                                                              BIG DELTA, AK
        FOR DAYS MON TUE WED THU FRI
        SCHEDULE FULL ON
      THROUGH 31 12
         FOR DAYS SUN MON TUE WED THU FRI SAT HOL
      SCHEDULE INFL ACTIV
      THROUGH 5 6
      FOR DAYS SUN MON TUE WED THU FRI SAT HOL
        THROUGH 31 12
EMC ENGINEERS INC. EZDOE - ELITE SOFTWA
DENVER, CO 80227
REPORT- LV-G DETAILS OF SCHEDULES OCCURRING IN THE PROJECT
         ENGINEERS
                            EZDOE - ELITE SOFTWARE DEVELOPMENT INC
                                                             DOE-2.1D 11/28/1995
                                                                                9:24:10 LDL RIN 1
                                                             BIG DELTA, AK
        FOR DAYS SUN MON TUE WED THU FRI SAT HOL
        SCHEDULE GYM INFL
      THROUGH 5 6
        FOR DAYS SUN SAT HOL
        FOR DAYS MON TUE WED THU FRI
      THROUGH 31 12
      FOR DAYS SUN SAT HOL
        EMC ENGINEERS INC. EZDOE - ELITE SOFTW.
DENVER, CO 80227
REPORT- LV-G DETAILS OF SCHEDULES OCCURRING IN THE PROJECT
                            EZDOE - ELITE SOFTWARE DEVELOPMENT INC
                                                             DOE-2.1D 11/28/1995
                                                             BIG DELTA, AK
      EMC ENGINEERS INC.
DENVER, CO 80227
REPORT- LS-A SPACE PEAK LOADS SUMMARY
                            EZDOE - ELITE SOFTWARE DEVELOPMENT INC
                                                             DOE-2.1D 11/28/1995
                                                                               9:24:10 LDL RUN 1
                                                             BIG DELTA, AK
                        COOLING LOAD
(KBTU/HR)
44.791
206.882
20.932
46.007
27.248
                                       TIME OF PEAK 31 2 PM 13 6 PM 11 1 PM 15 1 PM 15 1 PM 15 2 5 PM
                                                                    TIME OF PEAK DEC 10 11 AM FEB 5 5 AM DEC 10 11 AM JAN 23 3 PM JAN 23 3 PM JAN 23 3 PM JAN 23 3 PM
                                               DRY-
BULB
72.F
73.F
70.F
80.F
70.F
                                                         HEATING LOAD (KBTU/HR)
SPACE NAME
INTERIOR C
EXTER ZNC
KITCHEN
                                                   BULB
55.F
60.F
54.F
55.F
55.F
                                                                               BY-
BULB BULB
-22.F -22.F
-44.F -44.F
-22.F -22.F
-13.F -14.F
-13.F -14.F
                                   AUG 31
AUG 13
AUG 31
AUG 30
AUG 31
JUL 12
                                                            (KBTU/HR)
-384.693
-436.093
-21.309
-562.438
-248.751
-183.747
               1.
1.
GYM
ADJ TO GYM
DINEMP
                            27.248
10.120
SUM
                           355.980
                                                           -1837.030
BUILDING PEAK
                           272.741
                                   AUG 31 2 PM
                                               72.F 55.F
                                                           -1757.522
                                                                    JAN 23 3 PM
                                                                              -13.F -14.F
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EMC ENGINEERS INC. EZDOE - ELITE SOFTWARE DEVELOPMENT INC DENVER, CO 80227
REPORT- LS-B SPACE PEAK LOAD COMPONENTS INTERIOR_C
                                                                                                                                                                        DOE-2.1D 11/28/1995 9:24:10 LDL RUN 1
                                                                                                                                                               BIG DELTA, AK
SPACE INTERIOR_C
                               DEC 10 11AM
-22F -30C
-22F -30C
                                                                                                                                                                                  HEATING LOAD
                                                          P 55F 13C

SENSIBLE (KBTU/H) ( KW ) (KBTU/H) ( KW )

0.000 0.000 0.000 0.000 0.000
35.480 10.391 0.000 0.000
0.000 0.000 0.000 0.000 0.000
0.000 0.000 0.000 0.000 0.000
0.000 0.000 0.000 0.000 0.000
0.000 0.000 0.000 0.000 0.000
0.000 0.000 0.000 0.000 0.000
29.137 8.534 28.500 8.347
32.259 9.448 0.000 0.000
0.000 0.000 0.000 0.000
0.000 0.000 0.000 0.000
0.000 0.000 0.000 0.000
0.212 0.062 0.000 0.000
0.212 0.062 0.000 0.000
0.212 13.118 28.500 8.347
73.291 KBTU/H 21.465 KW
3.60BTU/H.SQFT 11.358 W / M2
                                                                                                                                                                               WALLS
ROOFS
GLASS CONDUCTION
GLASS SOLAR
          GLASS SOLAR
DOOR
INTERNAL SURFACES
UNDERGROUND SURFACES
OCCUPANTS TO SPACE
LIGHT TO SPACE
EQUIPMENT TO SPACE
PROCESS TO SPACE
INFILTRATION
          TOTAL LOAD TOTAL LOAD / AREA
                                                                       NOTE 1) THE ABOVE LOADS EXCLUDE OUTSIDE VENTILATION AIR
LOADS
2) TIMES GIVEN IN STANDARD TIME FOR THE LOCATION
IN CONSIDERATION
EMC ENGINEERS INC. EZDOE - ELITE SOFTWARE DEVELOPMENT INC DOE-2.1D 11/28/1995 9:24:10 LDL RUN 1
DENVER, CO 80227
REPORT- LS-B SPACE PEAK LOAD COMPONENTS EXTER_ZN_C BIG DELTA, AK
SPACE EXTER_ZN_C
                                                                            1.0 FLOOR MULTIPLIER
8829 SOFT 820 M2
79461 CUFT 2250 M3
                                          MULTIPLIER
FLOOR AREA
VOLUME
                                                                                COOLING LOAD
                                                                                                                                                                                         HEATING LOAD
                                                                                                                                                                                   FEB 5 5AM 4WPAY 44F -42C -44F -42C
                                                                               AUG 13 6PM
73F 23C
60F 16C
                                                         SENSIBLE
(KBTU/H) ( KW )
-129.470 -37.919
-75.929 -22.238
-170.843 -50.036
5.350 1.567
0.000 0.000
0.000 0.000
0.000 -53.404 -15.641
1.233 0.361
1.233 0.361
0.000 0.000
0.000 0.000
0.000 0.000
0.000 3.832
           WALLS
ROOFS
GLASS CONDUCTION
GLASS SOLAR
          GLASS SOLAR
DOOR
INTERNAL SURFACES
UNDERGROUND SURFACES
COCCUPANTS TO SPACE
LIGHT TO SPACE
EQUIPMENT TO SPACE
PROCESS TO SPACE
INFILTRATION
                                                                                                                                                               -13.083 -3.832

-436.093 -127.721

-436.093 KBTU/H -127.721

49.393BTU/H.SQFT 155.711
                                                                                                                        0.000
KW
W / M2
           TOTAL LOAD
TOTAL LOAD / AREA
                                                                     * NOTE 1) THE ABOVE LOADS EXCLUDE OUTSIDE VENTILATION AIR
LOADS
2) TIMES GIVEN IN STANDARD TIME FOR THE LOCATION
IN CONSIDERATION
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DENVER, CO EPORT- LS-B SPACE PEAK LOA	INC. EZDOE - 80227 AD COMPONENTS	ELITE SOFTWARE DEVELOP	MENT INC D	OOE-2.1D 11/28/1995 9:24:10 LDL RUN :
PACE KITCHEN				
MULTIPI FLOOR VOLUME	LIER 1.0 AREA 910 SOFT 8190 CUFT	FLOOR MULTIPLIER 85 M2 232 M3	1.0	
TIME DRY-BULB TEN WET-BULB TEN	AUG 31	G LOAD 1PM 21C 12C	===	HEATING LOAD DEC 10 11AM -22F -30C -22F -30C
WALLS ROOFS GLASS CONDUCTION GLASS SOLAR DOOR INTERNAL SURFACES UNDERGROUND SURFACES OCCUPANTS TO SPACE LIGHT TO SPACE EQUIPMENT TO SPACE PROCESS TO SPACE INFILTRATION TOTAL TOTAL TOTAL LOAD TOTAL LOAD	SENSIBLE (KBTU/H) (KW)	LATENT (KBTU/H) (KW)	 -21.309 KBT 23.416BTU/	-22F -30C SENSIBLE (BTU/H) (KW) -0.000
EMC ENGINEERS DENVER CO EPORT- LS-B SPACE PEAK LOA	* 2)TIME * 2)TIME * IN C	S GIVEN IN STANDARD TIM ONSIDERATION ***********************************	E FOR THE LOCATIO	N * * * * * * * * * * * * * * * * * * *
PORT- LS-B SPACE PEAR LOA	D COMPONENTS	GYM	В	IG DELTA, AK
ACE GYM MULTIPL FLOOR VOLUME	IER 1.0 AREA 8150 SOFT 203750 CUFT	FLOOR MULTIPLIER 757 M2 5770 M3	1.0	
TIME DRY-BULB TEM WET-BULB TEM	COOLIN AUG 30 P 80F P 55F	G LOAD ========= 1PM 27C 13C	===	HEATING LOAD JAN 23 3PM -13F -25C -14F -26C
WALLS ROOFS GLASS CONDUCTION GLASS SOLAR DOOR INTERNAL SURFACES UNDERGROUND SURFACES OCCUPANTS TO SPACE LIGHT TO SPACE	SENSIBLE (KBTU/H) (KW)	LATENT (KBTU/H) (KW) 0.000		SENSIBLE BTU/H) (Kw)
EQUIPMENT TO SPACE PROCESS TO SPACE INFILTRATION TOTAL TOTAL LOAD TOTAL LOAD / AREA	46.007 13.474 106.007 KBTU/H 13.01BTU/H.SOFT	60.000 17.573 31.047 KW 41.004 W / M2	-56 -562.438 KBTU 69.011BTU/F	62.438 -164.724 U/H -164.724 KW H.SQFT 217.555 W/M2

EMC ENGINEERS DENVER, CO REPORT- LS-B SPACE PEAK LOF	INC. EZDOE -	ELITE SOFTWARE DEVELOPM	MENT INC	DOE-2.1D 1	1/28/1995	9:24:10 LDL RUN 1
REPORT- LS-B SPACE PEAK LOA	AD COMPONENTS	ADJ_TO_GYM		BIG DELTA,	AK	
SPACE ADJ_TO_GYM						
MULTIPI FLOOR VOLUME	IER 1.0 AREA 7097 SOFT 63873 CUFT	FLOOR MULTIPLIER 659 M2 1809 M3	1.0			
TIME DRY-BULB TEM WET-BULB TEM	AUG 31	G LOAD 1PM 21C 12C		HEATING JAN 23 3 -13F -14F	====== PM	
WALLS ROOFS GLASS CONDUCTION GLASS SOLAR DOOR INTERNAL SURFACES UNDERGROUND SURFACES OCCUPANTS TO SPACE LIGHT TO SPACE EQUIPMENT TO SPACE PROCESS TO SPACE INFILTRATION TOTAL TOTAL TOTAL LOAD TOTAL LOAD	SENSIBLE (KBTU/H) (KW) 14.537 4.257 13.410 3.927 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 -17.736 -5.194 11.499 3.368 5.538 1.622 0.000 0.000 0.000 0.000 0.000 0.000 27.248 7.980 57.208 KBTU/H 8.06BTU/H.SOFT	LATENT (KBTU/H) (KW) 0.000 1.960 0.574 0.000 0.000 29.9600 8.775 16.755 KW 25.412 W / M2	-248.751 35.0508	SENSIBL (KBTU/H) (KW) 12.523 12.847 0.000 0.000 0.000 0.000 11.247 1.546 1.705 0.000 0.000 0.000	M 2
EMC ENGINEERS DENVER, CO REPORT- LS-B SPACE PEAK LOAJ	* LOADS * 2)TIMES * IN CC	S GIVEN IN STANDARD TIME DNSIDERATION	FOR THE LOCA	ATION *	./28/1995 \X	9:24:10 LDL RUN 1
SPACE DINAMP						
	IER 1.0 AREA 4900 SOFT 98000 CUFT	FLOOR MULTIPLIER 455 M2 2775 M3	1.0			
TIME DRY-BULB TEMI	COOLING JUL 12 87F	LOAD 5PM 31C		HEATING I JAN 23 3F -13F -14F		
WALLS ROOPS GLASS CONDUCTION GLASS SOLAR DOOR INTERNAL SURFACES UNDERGROUND SURFACES OCCUPANTS TO SPACE LIGHT TO SPACE EQUIPMENT TO SPACE PROCESS TO SPACE INFILITRATION TOTAL TOTAL TOTAL TOTAL LOAD TOTAL LOAD	10.120 2.964 10.120 KBTU/H 2.07BTU/H.SQFT	0.000 0.000 0.000 0.000 0.000 0.000 2.964 KW 6.511 W / M2	-183.747	0.000 0.000 -88.656 -2 	W) 2.297 9.077 0.000 0.000 0.000 0.000 7.946	M2
	* LOADS * 2)TIMES * IN CO	BOVE LOADS EXCLUDE OUTS	FOR THE LOCA	rion *		

THE THE DE G DOLLADING LDI	80227 K LOD COMPONENTS	DOE-2.1D 11/28/1995 9:24	:10 LDL RUN 1
*** BUILDING ***	INC. EZDOE - ELITE SOFTWARE DEVELOPMENT INC 80227 K LOAD COMPONENTS	BIG DELTA, AK	
	AREA 50228 SQFT 4666 SQMT E 636352 CUFT 18021 CUMT		
	COOLING LOAD	HEATING LOAD	
DRY-BULB T WET-BULB T	EMP 72F 22C	JAN 23 3PM	
	SENSIBLE LATENT (KBTU/H) (KW)	SENSIBLE (KBTU/H) (KW)	
WALLS ROOFS GLASS CONDUCTION GLASS SOLAR DOOR INTERNAL SURFACES UNDERGROUND SURFACES OCCUPANTS TO SPACE LIGHT TO SPACE EQUIPMENT TO SPACE	SENSIBLE LATENT (KETU/H) (KW) (KBTU/H) (KW) 26.775 7.842 0.000 0.000 85.800 25.129 0.000 0.000 -0.588 -0.172 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 -125.583 -36.780 0.000 0.000 -125.583 -36.780 0.000 0.000 96.407 28.235 145.950 42.745 77.390 22.666 0.000 0.000 0.000 0.000 0.000 12.041 3.527 32.160 9.419 1.152 0.337 0.000 0.000 12.041 3.527 32.160 9.419 1.152 0.337 0.000 0.000 272.741 79.879 178.110 52.164 450.851 KETU/H 132.043 W -1757.52	-245.905 -72.019 -312.866 -91.631 -141.328 -41.391 18.996 5.563 0.000 0.000 0.000 0.000 -271.906 -79.635 43.046 12.607 46.716 13.682	
INFILTRATION TOTAL	12.041 3.527 32.160 9.419 1.152 0.337 0.000 0.000	4.215 1.234 -898.490 -263.145	
TOTAL LOAD TOTAL LOAD / AREA	272.741	-1757.522 -514.734 2 KBTU/H -514.734 KW 1BTU/H.SQFT 110.308 W /SQMT	
	* NOTE 1) THE ABOVE LOADS EXCLUDE OUTSIDE VENTILA LOADS 2) TIMES GIVEN IN STANDARD TIME FOR THE LO IN CONSIDERATION	CATION *	
EMC ENGINEERS DENVER, CO REPORT- LS-D BUILDING MONT	INC. EZDOE - ELITE SOFTWARE DEVELOPMENT INC 80227 HLY LOADS SUMMARY	DOE-2.1D 11/28/1995 9:24: BIG DELTA, AK	
COOLING TIME ENERGY OF MAX	O L I N G H E A T : MAXIMUM H E A T : DRY- WET- COOLING HEATING TIME DRY- BULB BULB LOAD ENERGY OF MAY BULL	INGE MAXIMUM ELEC WET- HEATING TRICA	LEC MAXIMUM L ELEC
COOLING TIME ENERGY OF MAX	***************************************	INGE MAXIMUM ELEC WET- HEATING TRICA	LEC - MAXIMUM L ELEC

EMC DEN LDS_RPT_	ENGINEERS VER, CO 1 = HOUR	INC. 80227 LY-REPORT	EZDOE -	ELITE SO	FTWARE DEVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:58:37 LDL RUN 1
MMDDHH	BUILDING	BUILDING	GLOBAL	GLOBAL	GLOBAL		
	SENSIBLE HTG LOAD	LATENT HTG LOAD	DRY BULB	GROUND ABS TEMP	SNOW FLAG		
MONTHLY	(1) SUMMARY (JAN)	(2)	(4)	(2)	(7)		
MN MX SM AV MONTHLY	-1757523. -611893. -771729600. -1037271.	0. 178110. 26385040. 35464.	-42.0 18.0 -3378.0 -4.5	474.6 474.6 353122.9 474.6	0. 1. 100. 0.	,	
MN MX SM AV	SENSIBLE HTG LOAD BTU/HR (1) SUMMARY (JAN) -611893. -771729600. -1037271. SUMMARY (FEB) -1425285. -375395. -632603264. -941374.	0. 178110. 23673360. 35228.	-44.0 40.0 1340.0 2.0	469.6 469.6 315544.8 469.6	0. 10. 0.		
MN MX SM AV MONTHLY	-1293416. -217540. -578261504. -777233.	0. 178110. 28484470. 38286.	-53.0 42.0 6894.0 9.3	469.2 469.2 349051.3 469.2	0. 18. 48. 0.		
MN MX SM AV MONTHLY	-632603264 -941374 SUMMARY (MAR) -1293416 -217540 -578261504 -777233 SUMMARY (APR) -1010668 -142705 -405140736 -562695 SUMMARY (MAY) -677164 -21411 -241652144 -324801 SUMMARY (JUN) -470972 0 -160629744 -223097 SUMMARY (JUL) -416743 0 -150629744 -23097 SUMMARY (JUL) -416743 0 -135042240 -181508	0. 162570. 24380300. 33862.	-13.0 52.0 19827.0 27.5	471.6 471.6 339522.8 471.6	0. 1. 68. 0.		·
MN MX SM AV MONTHLY	-677164. -21411. -241652144. -324801. SUMMARY (JUN)	0. 162570. 22947736. 30844.	25.0 70.0 35459.0 47.7	481.2 481.2 358021.8 481.2	0. 1. 2. 0.		
MN MX SM AV MONTHLY	-470972. 0. -160629744. -223097. SUMMARY (JUL)	0. 124520. 1897805. 2636.	41.0 82.0 41425.0 57.5	490.8 490.8 353390.3 490.8	0. 0. 0.		
Min Mix SM AV	-416743. 0. -135042240. -181508.	0. 0. 0.	38.0 87.0 44355.0 59.6	499.1 499.1 371367.1 499.1	0. 0. 0.		
EMC DEN LDS_RPT_	ENGINEERS VER, CO 1 = HOURI	INC. 80227 LY-REPORT	EZDOE -	ELITE SO	FTWARE DEVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:58:37 LDL RUN 1
EMC DEN LDS_RPT_	ENGINEERS VER, CO 1 = HOURI	INC. 80227 LY-REPORT	EZDOE -	ELITE SO	FTWARE DEVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:58:37 LDL RUN 1
EMC DEN LDS_RPT_	ENGINEERS VER, CO 1 = HOURI	INC. 80227 LY-REPORT	EZDOE -	ELITE SO	FTWARE DEVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:58:37 LDL RUN 1
EMC DEN LDS_RPT_	ENGINEERS VER, CO 1 = HOURI	INC. 80227 LY-REPORT	EZDOE -	ELITE SO	FTWARE DEVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:58:37 LDL RUN 1
EMC DEN LDS_RPT_	ENGINEERS VER, CO 1 = HOURI	INC. 80227 LY-REPORT	EZDOE -	ELITE SO	FTWARE DEVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:58:37 LDL RUN 1
EMC DEN LDS_RPT_	ENGINEERS VER, CO 1 = HOURI	INC. 80227 LY-REPORT	EZDOE -	ELITE SO	FTWARE DEVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:58:37 LDL RUN 1
EMC DEN LDS_RPT_	ENGINEERS VER, CO 1 = HOURI	INC. 80227 LY-REPORT	EZDOE -	ELITE SO	FTWARE DEVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:58:37 LDL RUN 1
MONTHLY MY	ENGINEERS VER, CO 1 = HOUR	INC. 80227 LY-REPORT BUILDING LATENT HTG LOAD BTU/HR(2) 153920. 2438905. 3278. 0. 162570. 22228098. 30872. 0. 162570. 25859190. 34757.	GLOBAL DRY BULB TEMP F (4)	GLOBAL GROUND ABS TEMP R (2) 504.4 4504.4 375292.8 504.9 363509.2 504.9 363509.2 504.9 363509.2 504.9 363509.3 504.9 363509.3 504.9 504.9 504.9 504.9 504.9 504.9 504.9 504.9 504.9 504.9 504.9 504.9 504.9 504.9 504.9	GLOBAL SNOW FLAG(7) 0. 0. 0. 0. 1. 15. 0. 0. 0. 1. 38. 0. 0. 0. 1. 38. 0. 0.	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:58:37 LDL RUN 1
MONTHLY MN MX SM AV MONTHLY MX SM AV	BUILDING SENSIBLE HTG LOAD BUILTING SENSIBLE HTG LOAD BTU/HR(1) SUMMARY (AUG) -399357. 0141883408190704. SUMMARY (SEP) -5571694977215896464299856. SUMMARY (OCT) -781565198637393495904528892. SUMMARY (NOV) -10772473994072564183360783588.	INC. 80227 LY-REPORT BUILDING LATENT HTG LOAD BTU/HR(2) 153920 2438905 3278. 0. 162570. 2228098. 30872. 0. 162570. 25859190. 34757. 24660800.	GLOBAL DRY BULB TEMP F (4) 37.0 41588.0 55.9 18.0 30923.0 42.9 -7.0 45.0 18356.0 24.7 -30.0 5216.0 7.2 -47.0 20.0	GLOBAL GROUND ABS TEMP R (2) 504.4 4504.4 375292.4 504.9 363509.2 504.9 363509.2 500.6 500.6 372433.1 500.6 492.5 354575.3	GLOBAL SNOW FLAG(7) 0. 0. 0. 1. 15. 0. 0. 1. 15. 0. 0. 1. 38. 0. 0. 0. 1. 39. 0. 0. 0. 1. 28.	DOE-2.1D 11/28/1995 BIG DELTA, AK	9:58:37 LDL RUN 1

REPORT-	VER, SS-D PLAN		LOADS SUM	MARY FOR		DEFA	DEVELOPMEN	:		.1D 11/2	28/1995	9:58:37	SDL RUN 1
MONTH	COOLING ENERGY (MBTU)	mr.m	DRY- WET- BULB BULB TEMP TEM		MITMIXAN	HEAT ENE (ME		HEAT TIME DRY MAX BUI HR TEN	ING K- WET- LB BULB MP TEMP	MAXI HEAT I (KBTU/	IMUM FING JOAD 'HR)	E L ELEC- TRICAL ENERGY (KWH)	MAXIM EL. LOA (KW)
JAN FEB MAR APR APR JUN JUN JUL AUG SEP OCT NOV DEC TOTAL MAX	0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000				0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	-877 -709 -636 -430 -205 -80 -65 -82 -195 -425 -635 -829	159 998 280 19 947 14 255 3 168 27 051 052 26 052 25 39 27 28 29 29 29 20 20 20 20 20 20 20 20 20 20	12 -20 11 7 7 33 8 52 6 43 2 47 7 22 12 12	F-15.FF F-29.FF F-29.FF F-29.FF F-29.FF F-48.FF F-44.FF F-11.FF F-21.FF F-21.FF	-2261 -2082 -1926 -1538 -827 -325 -260 -977 -674 -1248 -1579 -2297	032 449 754 704 867	19455. 17577. 19786. 18774. 19621. 3857. 4538. 18774. 19455. 18774. 19289.	51.011 51.011 51.011
	ENGIN VER, SS-O TEMPI				- ELITE S	FOR DIN		T INC		.1D 11/2	 8/1995	9:58:37	SDL RUN 1
	HOUF 81-85 76-80 71-75 66-70 61-65 BELOW 60	0 0 0 230 23 54 5	3 4 0 0 0 0 0 0 0 0 0 0 0 224 221 4 60 63 0 0 0	0 0 0 0 220 217 64 67 0 0	0 0 0 0 0 0 150 154 1 134 130 1 0 0	0 0 0 0 0 0 156 159 15 128 125 12 0 0	0 0 0 0 0 0 0 0 0 0 0 0 8 155 163 6 129 121 0 0 0	0 0 0 0 170 169 114 115 0 0	214 222 2 70 62 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 8 230 228 66 54 56 0 0 0	0 0 0 0 0 0 8 230 228 5 54 56 0 0 0	4812 2004 0
EMC DENV REPORT- I	ENGIN VER, PS-A PLANT	VEERS CO CENERGY U	INC. 80227	EZDOE	- ELITE S	SOFTWARE D	DEVELOPMEN	T INC	DOE-2 BIG D	.1D 11/2 ELTA, AK	8/1995	9:58:37	PDL RUN 1
EMC DENV REPORT- I	ENGIN VER, PS-A PLANT	NEERS CO I ENERGY U	INC. 80227	EZDOE	- ELITE S	SOFTWARE D	EVELOPMEN NERG	T INC	BIG D	ELTA, AK		9:58:37	* source
EMC DENV REPORT- I	2 TOTAL HEAT	3	INC. 80227 TILIZATION	EZDOE SUMMARY 5	S 6	ITE E	NERG	T INC	10	11		13 TOTAL	SOURCE 14 TOTAL SOURCE
REPORT- P	2 TOTAL HEAT H LOAD	3	INC. 80227 TILIZATION	EZDOE SUMMARY 5	S 6	ITE E	NERG	Y 9 FUEL INPUT HEATING	10	11 FUEL INPUT ELECT	12 TOTAL FUEL	13 TOTAL SITE	SOURCE 14 TOTAL SOURCE ENERGY
MONTE	2 TOTAL HEAT H LOAD	3 TOTAL COOLING LOAD	INC. 80227 TILLIZATION 4 TOTAL ELECTR LOAD	EZDOE SUMMARY 5 RCVRED ENERGY	S 6 WASTED RCVRABL ENERGY	I T E F 7 FUEL INPUT COOLING	N E R G BELEC INPUT COOLING 0.0 0.00	Y 9 FUEL INPUT HEATING	10 ELEC INPUT HEATING	11 FUEL INPUT ELECT	12 TOTAL FUEL INPUT	13 TOTAL SITE ENERGY	SOURCE 14 TOTAL SOURCE ENERGY 1738.0
MONTH JAN	2 TOTAL HEAT LOAD 911.7	3 TOTAL COOLING LOAD 0.0	INC. 80227 TILIZATION 4 TOTAL ELECTR LOAD 	EZDOE N SUMMARY 5 RCVRED ENERGY 0.0	S 6 WASTED RCVRABL ENERGY	I T E F 7 FUEL INPUT COOLING	N E R G BELEC INPUT COOLING 0.0 0.00	Y 9 FUEL INPUT HEATING 0.0 0.0	10 ELEC INPUT HEATING 6.3 1.9E	11 FUEL INPUT ELECT 0.0	12 TOTAL FUEL INPUT	13 TOTAL SITE ENERGY	SOURCE 14 TOTAL SOURCE ENERGY 1738.0 1430.8
MONTH JAN FEB	2 TOTAL HEAT LOAD 911.7 740.0	3 TOTAL COOLING LOAD	## 100	EZDOE N SUMMARY 5 RCVRED ENERGY 0.0	S 6 WASTED RCVRABL ENERGY	I T E F 7 FUEL INPUT COOLING	N E R G 8 ELEC INPUT COOLING 0.0 0.0E 0.0	Y 9 FUEL INPUT HEATING 0.0 0.0	10 ELEC INPUT HEATING 6.3 1.9E 5.7 1.7E	11 FUEL INPUT ELECT 0.0 0.0	12 TOTAL FUEL INPUT 0.0	13 TOTAL SITE ENERGY 984.4 805.8	SOURCE 14 TOTAL SOURCE ENERGY 1738.0 1430.8
MONTH JAN FEB MAR	2 TOTAL HEAT H LOAD 911.7 740.0 673.3	3 TOTAL COOLING LOAD 0.0 0.0	## 100	EZDOE N SUMMARY 5 RCVRED ENERGY 0.0 0.0	S 6 WASTED RCVRABL ENERGY 0.0	I T E E 7 FUEL INPUT COOLING 0.0 0.0	NERG 8 ELEC INPUT COOLING 0.00 0.00 0.00 0.00	Y 9 FUEL INPUT HEATING 0.0 0.0 0.0	10 ELEC INPUT HEATING 	11 FUELL INPUT ELECT 0.0 0.0 0.0	TOTAL FUEL INPUT 0.0 0.0	13 TOTAL SITE ENERGY 984.4 805.8	SOURCE 14 TOTAL SOURCE ENERGY 1738.0 1430.8 1344.1 982.6
MONTH JAN FEB MAR APR	2 TOTAL HEAT LOAD 911.7 740.0 673.3 463.0	3 TOTAL COOLING LOAD 0.0 0.0	## 100	EZDOE N SUMMARY 5 RCVRED ENERGY 0.0 0.0 0.0	S 6 WASTED RCVRABL ENERGY 0.0 0.0 0.0	I T E F 7 FUEL INPUT COOLING 0.0 0.0	NERG 8 ELEC INPUT COOLING 0.00 0.00 0.00 0.00	Y 9 FUEL INPUT HEATING 0.0 0.0 0.0 0.0	10 ELEC INPUT HEATING 	11 FUEL INPUT ELECT 0.0 0.0 0.0 0.0	12 TOTAL FUEL INPUT 0.0 0.0 0.0	13 TOTAL SITE ENERGY 984.4 805.8 747.2	SOURCE 14 TOTAL SOURCE ENERGY 1738.0 1430.8 1344.1 982.6 622.2
MONTH JAN FEB MAR APR MAY	2 TOTAL HEAT LOAD 911.7 740.0 673.3 463.0 241.2	3 TOTAL COOLING LOAD 0.0 0.0 0.0	## 100	SUMMARY 5 RCVRED ENERGY 0.0 0.0 0.0 0.0	S 6 WASTED RCYRABL ENERGY O.O	I T E F 7 FUEL INPUT COOLING 0.0 0.0 0.0	NERG 8 ELECINPUT COOLING 0.0 0.0E 0.0 0.0E 0.0 0.0E	Y 9 FUEL INPUT HEATING	10 ELEC INPUT HEATING 6.3 1.9E 5.7 1.7E 6.3 1.9E 6.1 1.8E 6.3	11 FUEL INPUT ELECT 0.0 0.0 0.0 0.0	12 TOTAL FUEL INPUT 0.0 0.0 0.0 0.0	13 TOTAL SITE ENERGY 984.4 805.8 747.2 533.2	SOURCE 14 TOTAL SOURCE ENERGY 1738.0 1430.8 1344.1 982.6 622.2
MONTH JAN FEB MAR APR MAY JUN	2 TOTAL HEAT LOAD 911.7 740.0 673.3 463.0 241.2	TOTAL COOLING LOAD	## A TOTAL ELECTR LOAD	SUMMARY SUMMARY SRCVRED ENERGY 0.0 0.0 0.0 0.0 0.0	S 6 WASTED RCVRABL ENERGY 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	I T E F 7 FUEL INPUT COOLING 0.0 0.0 0.0 0.0	ELEC INPUT COOLING O.O O.O O.O O.O O.O O.O O.O O.O O.O O.	Y 9 FUEL INPUT HEATING 0.0 0.0 0.0 0.0 0.0	10 ELEC INPUT HEATING 	11 FUEL INPUT ELECT 0.0 0.0 0.0 0.0	12 TOTAL FUEL INPUT 0.0 0.0 0.0 0.0 0.0	13 TOTAL SITE ENERGY 984.4 805.8 747.2 533.2 314.5	SOURCE 14 TOTAL SOURCE ENERGY 1738.0 1430.8 1344.1 982.6 622.2 213.2 153.6
MONTH JAN FEB MAR APR MAY JUN	2 TOTAL HEAT LOAD 911.7 740.0 673.3 463.0 241.2 93.8	3 TOTAL COOLING LOAD 0.0 0.0 0.0 0.0 0.0	## A TOTAL ELECTR LOAD	5 RCVRED ENERGY 0.0 0.0 0.0 0.0 0.0 0.0	S S 6 WASTED RCVRABL ENERGY 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	I T E F THELLINPUT COOLING O.O O.O O.O O.O O.O O.O	NERG 8 ELEC INPUT COOLING 0.0 0.0E 0.0 0.0E 0.0 0.0E 0.0 0.0E 0.0 0.0	Y 9 FUEL INPUT HEATING 0.0 0.0 0.0 0.0 0.0 0.0	10 ELEC INPUT HEATING 	11 FUEL INPUT ELECT 0.0 0.0 0.0 0.0 0.0	12 TOTAL FUEL INPUT 0.0 0.0 0.0 0.0 0.0 0.0	13 TOTAL SITE ENERGY 984.4 805.8 747.2 533.2 314.5	SOURCE 14 TOTAL SOURCE ENERGY 1738.0 1430.8 1344.1 982.6 622.2 213.2 153.6 226.5
MONTH JAN FEB MAR APR MAY JUN JUL AUG	2 TOTAL HEAT LOAD 911.7 740.0 673.3 463.0 241.2 93.8 75.7 97.2 227.6	3 TOTAL COOLING LOAD 0.0 0.0 0.0 0.0 0.0 0.0 0.0	## A	5 RCVRED ENERGY 0.0 0.0 0.0 0.0 0.0 0.0	S 6 WASTED RCYRABL ENERGY 0.0 0.0 0.0 0.0 0.0 0.0 0.0	I T E F 7 FUEL INPUT COOLING 0.0 0.0 0.0 0.0 0.0	NERG 8 ELECINPUT COOLING 0.0 0.0E 0.0 0.0E 0.0 0.0E 0.0 0.0E 0.0 0.0	Y 9 FUEL INPUT HEATING 0.0 0.0 0.0 0.0 0.0 0.0 0.0	10 ELEC INPUT HEATING 6.3 1.9E 5.7 1.7E 6.3 1.9E 6.1 1.8E 6.3 1.7E 5.8 1.7E	11 FUEL INPUT ELECT 0.0 0.0 0.0 0.0 0.0 0.0 0.0	12 TOTAL FUEL INPUT 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	13 TOTAL SITE ENERGY 984.4 805.8 747.2 533.2 314.5 112.8 84.8	SOURCE 14 TOTAL SOURCE ENERGY 1738.0 1430.8 1344.1 982.6 622.2 213.2 153.6 226.5 590.1
MONTH JAN FEB MAR APR MAY JUN JUL AUG SEP	2 TOTAL HEAT LOAD 911.7 740.0 673.3 463.0 241.2 93.8 75.7 97.2 227.6	3 TOTAL COOLING LOAD 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	## A	5 RCVRED ENERGY 0.0 0.0 0.0 0.0 0.0 0.0 0.0	S 6 WASTED RCVRABL ENERGY 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	I T E F 7 FUEL INPUT COOLING 0.0 0.0 0.0 0.0 0.0 0.0 0.0	EVELOPMEN N E R G 8 ELEC INPUT COOLING 0.0E 0.0E 0.0E 0.0E 0.0E 0.0E 0.0E 0.0	Y 9 FUEL INPUT HEATING 0.0 0.0 0.0 0.0 0.0 0.0 0.0	10 ELEC INPUT HEATING	11 FUEL INPUT ELECT 0.0 0.0 0.0 0.0 0.0 0.0	12 TOTAL FUEL INPUT 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	13 TOTAL SITE ENERGY 984.4 805.8 747.2 533.2 314.5 112.8 84.8 118.7	SOURCE 14 TOTAL SOURCE ENERGY 1738.0 1430.8 1344.1 982.6 622.2 213.2 153.6 226.5 590.1
MONTH JAN FEB MAR APR MAY JUN JUL AUG SEP	2 TOTAL HEAT LOAD 911.7 740.0 673.3 463.0 241.2 93.8 75.7 97.2 227.6 459.8	3 TOTAL COOLING LOAD 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	## A	5 RCVRED ENERGY 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	- ELITE S 6 WASTED RCVRABL ENERGY 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	I T E F 7 FUEL INPUT COOLING 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	8 ELEC INPUT COOLING 0.0 E 0.0	Y 9 FUEL INPUT HEATING 0.0 0.0 0.0 0.0 0.0 0.0 0.0	10 ELEC INPUT HEATING	11 FUEL INPUT ELECT 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	12 TOTAL FUEL INPUT 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	13 TOTAL SITE ENERGY 984.4 805.8 747.2 533.2 314.5 112.8 84.8 118.7 297.8 532.5	SOURCE 14 TOTAL SOURCE ENERGY 1738.0 1430.8 1344.1 982.6 622.2 213.2 153.6 226.5 590.1 984.8 1324.4

BUILDING ENERGY ANALYSIS PROGRAM

DEVELOPED BY
LAWRENCE BERKELEY LABORATORY/UNIVERSITY OF CALIFORNIA
AND
James J. Hirsch/HIRSCH & ASSOCIATES/(805) 482-5515

FT GREELY SCHOOL SPACE AT 45F

WITH MAJOR SUPPORT FROM
UNITED STATES DEPARTMENT OF ENERGY
ASSISTANT SECRETARY FOR CONSERVATION AND RENEWABLE ENERGY
OFFICE OF BUILDINGS AND COMMUNITY SYSTEMS
BUILDING SYSTEMS DIVISION

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EMC ENGINEERS INC. EZDOE - E
DENVER, CO 80227
REPORT- LV-A GENERAL PROJECT AND BUILDING INPUT DOE-2.1D 11/28/1995 15:32:37 LDL RUN 1 EZDOE - ELITE SOFTWARE DEVELOPMENT INC BIG DELTA, AK

PERIOD OF STUDY STARTING DATE ENDING DATE NUMBER OF DAYS

> 1 JAN 1995 31 DEC 1995

SITE CHARACTERISTIC DATA

STATION NAME LATITUDE (DEG) LONGITUDE (DEG)

145.6 0. 0.0 BIG DELTA, AK 64.5

					- -	. 					-
	NGINEERS	INC		EZDOE - EI	LITE SOFTWA	ARE DEVELO	PMENT INC	DOE-2.1D	11/28/1995	15:32:37 LDL RUN :	1
DENVER, REPORT- LV-B S	UMMARY OF	8022 SPACES	OCCURRING	IN THE	PROJECT			BIG DELTA,	AK		
NUMBER OF SPACE	S 6	É	XTERIOR	6	INTERIOR	0					
SPACE	SPACE MULT	SPACE TYPE	AZIMUTH	LIGHTING (WATT / SQFT)	PEOPLE	EQUIP (WATT / SQFT)	INFILTRATION METHOD	AIR CHANGES PER HOUR	AREA (SQFT)	VOLUME (CUFT)	
INTERIOR C EXTER ZN C KITCHEN GYM ADJ TO GYM DINEMP	1.0 1.0 1.0 1.0	EXT EXT EXT EXT EXT	0.0 0.0 0.0 0.0 0.0	0.75 1.00 0.70 0.50 0.60 0.75	150.0 150.0 5.0 75.0 35.0	0.00 0.00 0.00 0.00 0.00	AIR-CHANGE AIR-CHANGE AIR-CHANGE AIR-CHANGE AIR-CHANGE AIR-CHANGE	1.00 1.00 1.00 1.00 1.00	20342.00 8829.00 910.00 8150.00 7097.00 4900.00	79461.00 8190.00 203750.00 63873.00	
BUILDING TOTALS	:				565.0				50228.00	636352.00	

EMC ENGII DENVER, REPORT- LV-C DETAII	NEERS INC. CO 80227 LS OF SPACE	EZDOE -	ELITE SOFTWAI	RE DEVELOPMENT	INC D	DE-2.1D 11/28/1995 IG DELTA, AK	15:32:37 LDL RUN 1
DATA FOR SPACE							
LOCATION OF ORIGIN BUILDING COORDINATE	IN ES	SPACE					
XB (FT) YB (FT) 0.00 0.00	ZB (FT) 0.00	IMUTH (DEG) 0.00	SPACE MULTIPLIER 1.0	H	EIGHT (FT) 9.00	AREA (SOFT) 20342.00	VOLUME (CUFT) 183078.00
TOTAL NUME NUMBER EXT OF SURFACES SUF 4	BER OF NUMBER TERIOR INTERI RFACES SURFACE	OF NUMB OR UNDERG ES SUR 2	ER OF ROUND FACES 1	DAYLIGHTING NO	SUNSPACE NO		
NUMBER OF SUBSURFACE EXTERIOR TOTAL WINDOWS 0	CES INTERIO DOORS WINDOW	PR PS 0					
FLOOR WEIGHT (LB/SQFT) 70.0	CALCUI TEMPER (F	ATION ATURE) 45.0					
INFILTRATION	INFILTE	amron.				HEIGHT TO	
SCHEDULE INFL_ACTIV	CALCULA METHOD AIR-CHA	TION NGE	FLOW RATE (CFM/SOFT) 0.00	AIR CH PER	ANGES HOUR 1.00	NEUTRAL ZONE (FT) 0.0	
PEOPLE							
SCHEDULE FULL_OFF	N	UMBER 150.0	PERSON (SQFT) 135.6	ACT (BT	EOPLE IVITY J/HR) 0.0	PEOPLE SENSIBLE (BTU/HR) 230.0	PEOPLE LATENT (BTU/HR) 190.0
EMC ENGIN DENVER, REPORT- LV-C DETAIL	EERS INC. CO 80227 S OF SPACE	EZDOE ~	ELITE SOFTWAR	RE DEVELOPMENT	INC DO	DE-2.1D 11/28/1995 G DELTA, AK	15:32:37 LDL RUN 1
LIGHTING							
SCHEDULE FULL_OFF	LIG TYP REC	HTING E -FLUOR-RV	LOAD (WATTS/ SQFT) 0.75		LOAD (KW) 0.00	FRACTION OF LOAD TO SPACE 1.00	
INTERIOR SURFACES (U-VALUE			
SURFACE	AREA (SQFT) 10000.00 2000.00	CONSTRUCT ORESWALL ORESWALL	rion (BTU/		ADJACENT S EXTER ZN_C DIN&MP	PACE SURFACE-TYPE QUICK AIR QUICK AIR	3
EXTERIOR SURFACES (U-VALUE EXCLUDES	OUTSIDE AIR	FILM)				
SURFACE	MULTIPLIER 1.0	AREA (SOFT) 20449.00	WIDTH H (FT) 143.00 1	EIGHT (FT) 43.00	CONSTRUCTION ROOFCON	U-VALUE (BTU/HR-SOFT-F) 0.075	SURFACE TYPE QUICK
			LOCATION OF	ORIGIN IN		LOCATION OF ORIGIN SPACE COORDINATES	
SURFACE	AZIMUTH (DEG) 0.0	TILT (DEG) 0.0	XB (FT) Y	ORDINATES B (FT) ZB (FT) 0.00 0.00)	X (FT) Y (FT) 0.00 0.00	
UNDERGROUND SURFACE	S (U-VALUE INCLU	DES INSIDE A	R FILM)				
SURFACE	MULTIPLIER 1.0	(SQFT) 20449.00	CONSTRUCTION FLOORCON	U-VA BTU/HR-SQFT 0.	(-F)		

EMC ENGINEERS	INC. EZDOE	- ELITE SOFTWARE DE	VELOPMENT INC	DOE-2.1D 11/28/1995	15:32:37 LDL RUN 1
EMC ENGINEERS DENVER, CO REPORT- LV-C DETAILS OF	80227 SPACE	EXTER	_ZN_C	BIG DELTA, AK	
DATA FOR SPACE EXTER_					
LOCATION OF ORIGIN IN BUILDING COORDINATES	SPACE	CDACE	UPICUT	ADEA	VOLUME
XB (FT) YB (FT) ZB (F 0.00 0.00 0.	T) (DEG) 00 0.00	MULTIPLIER 1.0	(FT) 9.00	(SOFT) 8829.00	(CUFT) 79461.00
TOTAL NUMBER OF NUMBER OF SURFACES SURFACES 5	NUMBER OF NUM INTERIOR UNDER SURFACES SU 1	BER OF GROUND RFACES DAY	LIGHTING SUNSPACE NO NO	3	
NUMBER OF SUBSURFACES EXTERIOR TOTAL WINDOWS DOOR 4 4	0 0				
FLOOR WEIGHT (LB/SQFT) 70.0	CALCULATION TEMPERATURE (F) 45.0				
INFILTRATION		FLOW RATE (CFM/SQFT)	AIR CHANGES PER HOUR 1.00	HEIGHT TO NEUTRAL ZONE (FT)	
INFL_ACTIV PEOPLE	AIR-CHANGE				
		AREA PER PERSON	PEOPLE ACTIVITY (BTU/HR) 0.0	PEOPLE SENSIBLE (BTU/HR)	PEOPLE LATENT (BTU/HR) 190.0
SCHEDULE FULL_OFF	NUMBER 150.0	(SQFT) 58.9	(BTU/HR) 0.0	(BTU/HR) 230.0	190.0
EMC ENGINEERS DENVER, CO REPORT- LV-C DETAILS OF	INC. EZDOE	- ELITE SOFTWARE DE	VELOPMENT INC	DOE-2.1D 11/28/1995	15:32:37 LDL RUN 1
REPORT- LV-C DETAILS OF	SPACE	EXTER	_ZN_C	BIG DELTA, AK	
REPORT- LV-C DETAILS OF		TOND		FRACTION	
	SPACE LIGHTING TYPE REC-FLUOR-RV	TOND	ZN_C 		
LIGHTING SCHEDULE	LIGHTING TYPE REC-FLUOR-RV	LOAD (WATTS/ SQFT) 1.00	LOAD (KW) 0.00	FRACTION OF LOAD TO SPACE 1.00 LOAD TO SPACE	
LIGHTING SCHEDULE FULL_OFF	LIGHTING TYPE REC-FLUOR-RV	TOND	LOAD (KW) 0.00	FRACTION OF LOAD TO SPACE 1.00	
LIGHTING SCHEDULE FULL_OFF OTHER EQUIPMENT SCHEDULE DHW_CLASS INTERIOR SURFACES (U-VAL)	LIGHTING TYPE REC-FLUOR-RV SOURCE TYPE HOT-WATER UE INCLUDES BOTH AIR F	LOAD (WATTS/ SQFT) 1.00 LOAD (BTU/HR) 45000.0	LOAD (KW) 0.00 FRACTION OF SENSIBLE 0.00	FRACTION OF LOAD TO SPACE 1.00 LOAD TO SPACE LATENT 0.10	
LIGHTING SCHEDULE FULL_OFF OTHER EQUIPMENT SCHEDULE DHW_CLASS INTERIOR SURFACES (U-VAL)	LIGHTING TYPE REC-FLUOR-RV SOURCE TYPE HOT-WATER UE INCLUDES BOTH AIR F	LOAD (WATTS/ SQFT) 1.00 LOAD (BTU/HR) 45000.0	LOAD (KW) 0.00 FRACTION OF SENSIBLE 0.00	FRACTION OF LOAD TO SPACE 1.00 LOAD TO SPACE	
LIGHTING SCHEDULE FULL_OFF OTHER EQUIPMENT SCHEDULE DHW_CLASS INTERIOR SURFACES (U-VAL)	LIGHTING TYPE REC-FLUOR-RV SOURCE TYPE HOT-WATER UE INCLUDES BOTH AIR F AREA (SOFT) CONSTRU 10000.00 ORESWAL	LOAD (WATTS/ SQFT) 1.00 LOAD (BTU/HR) 45000.0 PLMS) CTION (BTU/HR-5	LOAD (KW) 0.00 FRACTION OF SENSIBLE 0.00 -VALUE OFT-F) ADJACEN 20.000 INTERIC	FRACTION OF LOAD TO SPACE 1.00 LOAD TO SPACE LATENT 0.10 TI SPACE SURFACE-TYPERC QUICK AIR	E
SCHEDULE FULL_OFF OTHER EQUIPMENT SCHEDULE DHW_CLASS INTERIOR SURFACES (U-VAL) SURFACE EXTERIOR SURFACES (U-VAL)	LIGHTING TYPE REC-FLUOR-RV SOURCE TYPE HOT-WATER UE INCLUDES BOTH AIR F AREA (SOFT) CONSTRU 10000.00 ORESWAL	LOAD (WATTS/ SQFT) 1.00 LOAD (BTU/HR) 45000.0 PLMS) CTION (BTU/HR-5	LOAD (KW) 0.00 FRACTION OF SENSIBLE 0.00 -VALUE OFT-F) ADJACEN 20.000 INTERIC	FRACTION OF LOAD TO SPACE 1.00 LOAD TO SPACE LATENT 0.10 TI SPACE SURFACE-TYPERC QUICK AIR	E
SCHEDULE FULL_OFF OTHER EQUIPMENT SCHEDULE DHW_CLASS INTERIOR SURFACES (U-VAL SURFACE EXTERIOR SURFACES (U-VAL SURFACE MU	LIGHTING TYPE REC-FLUOR-RV SOURCE TYPE HOT-WATER UE INCLUDES BOTH AIR F (SOFT) CONSTRU 10000.00 ORESWAIL UE EXCLUDES OUTSIDE AI LTIPLIER (SOFT) 1.0 8836.00 1.0 2439.00 1.0 2439.00 1.0 3294.00 1.0 1629.00	LOAD (WATTS/ SQFT) 1.00 LOAD (BTU/HR) 45000.0 LIMS) (CTION (BTU/HR-S L (FT) 94.00 94.0 256.00 9.0 271.00 9.0 271.00 9.0 366.00 9.0 181.00 9.0 BUILDING COORD	LOAD (KW) 0.00 FRACTION OF SENSIBLE 0.00 -VALUE OFT-F) ADJACEN 20.000 INTERIC T) CONSTRUCT 0 ROOFCON 0 WALL_CON 0 WALL_CON 0 WALL_CON 0 WALL_CON 0 WALL_CON	FRACTION OF LOAD TO SPACE 1.00 LOAD TO SPACE LATENT 0.10 TI SPACE U-VALUE CON (BTU/HR-SOFT-F) 0.180 0.180 0.180 0.180 LOCATION OF ORIGIN SPACE COORDINATES	E SURFACE TYPE QUICK QUICK QUICK QUICK QUICK QUICK
SCHEDULE FULL_OFF OTHER EQUIPMENT SCHEDULE DHW_CLASS INTERIOR SURFACES (U-VAL SURFACE EXTERIOR SURFACES (U-VAL SURFACE MU	LIGHTING TYPE REC-FLUOR-RV SOURCE TYPE HOT-WATER UE INCLUDES BOTH AIR F (SOFT) CONSTRU 10000.00 ORESWAIL UE EXCLUDES OUTSIDE AI LTIPLIER (SOFT) 1.0 8836.00 1.0 2439.00 1.0 2439.00 1.0 3294.00 1.0 1629.00	LOAD (WATTS/ SQFT) 1.00 LOAD (BTU/HR) 45000.0 LIMS) (CTION (BTU/HR-S L (FT) 94.00 94.0 256.00 9.0 271.00 9.0 271.00 9.0 366.00 9.0 181.00 9.0 BUILDING COORD	LOAD (KW) 0.00 FRACTION OF SENSIBLE 0.00 -VALUE OFT-F) ADJACEN 20.000 INTERIC T) CONSTRUCT 0 ROOFCON 0 WALL_CON 0 WALL_CON 0 WALL_CON 0 WALL_CON 0 WALL_CON	FRACTION OF LOAD TO SPACE 1.00 LOAD TO SPACE LATENT 0.10 TI SPACE SURFACE-TYP. R.C QUICK AIR U-VALUE TION (BTU/HR-SOFT-F) 0.075 0.180 0.180 0.180 0.180 0.180 1.180 LOCATION OF ORIGIN SPACE COORDINATES X (FT) Y (FT) 0.000 0.000 0.000 0.000	E SURFACE TYPE QUICK QUICK QUICK QUICK QUICK QUICK

EMC ENGINEERS DENVER, CO REPORT- LV-C DETAILS OF S	INC. EZDOE 80227	- ELITE SOFTWARE I	DEVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	15:32:37 LDL RUN 1
UNDERGROUND SURFACES (U-V SURFACE MUI	AREA (COET)		U-VALUE (BTU/HR-SQFT-F) 0.10		
		NIMBER	GLASS SET-	SKY	GROUND
WINDOW MUI	AREA LTIPLIER (SQFT) 43.0 21.00 25.0 21.00 57.0 21.00 23.0 21.00			HEIGHT FORM (FT) FACTOR 3.00 3.00 3.00 3.00 3.00	
	1001MPD 711	LOCATION OF OF BUILDING COORD	RIGIN IN DINATES	LOCATION OF ORIGIN SURFACE COORDINATE	IN S
WINDOW	LOCATED IN SURFACE	XB (FT) YB 0.00 0.00 0.00 0.00 0.00	(FT) ZB (FT) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	X (FT) Y (FT) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	
EMC ENGINEERS DENVER, CO REPORT- LV-C DETAILS OF	INC. EZDOE 80227 SPACE	- ELITE SOFTWARE I	DEVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	15:32:37 LDL RUN 1
DATA FOR SPACE KITCHE		· · · · · · · · · · · · · · · · · · ·			
LOCATION OF ORIGIN IN BUILDING COORDINATES XB (FT) YB (FT) ZB (FT) 0.00 0.00 0.00	AZIMUTH T) (DEG) 00 0.00	SPACE MULTIPLIER 1.0	HEIGHT (FT) 9.00	AREA (SQFT) 910.00	VOLUME (CUFT) 8190.00
TOTAL NUMBER OF NUMBER EXTERIOR	NUMBER OF NUM INTERIOR UNDER	MBER OF RGROUND JRFACES DA 1	AYLIGHTING SUNSPACE NO NO	1	
NUMBER OF SUBSURFACES EXTERIOR TOTAL WINDOWS DOOR	INTERIOR S WINDOWS 0 0				
FLOOR WEIGHT (LB/SQFT) 70.0	CALCULATION TEMPERATURE (F) 45.0				
INFILTRATION SCHEDULE	INFILTRATION CALCULATION METHOD AIR-CHANGE	FLOW RATE (CFM/SQFT)	AIR CHANGES PER HOUR 1.00	HEIGHT TO NEUTRAL ZONE (FT)	
INFL_ACTIV PEOPLE	AIR-CHANGE				
SCHEDULE FULL_OFF	NUMBER 5.0	AREA PER PERSON (SQFT) 182.0	PEOPLE ACTIVITY (BTU/HR) 0.0	PEOPLE SENSIBLE (BTU/HR) 230.0	PEOPLE LATENT (BTU/HR) 190.0
EMC ENGINEERS DENVER, CO REPORT- LV-C DETAILS OF	INC. EZDOE 80227 SPACE	- ELITE SOFTWARE	DEVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	15:32:37 LDL RUN 1
LIGHTING		LOAD		FRACTION	
SCHEDULE FULL_OFF	LIGHTING TYPE REC-FLUOR-RV	(WATTS/ SOFT) 0.70	LOAD (KW) 0.00	OF LOAD TO SPACE 1.00	
OTHER EQUIPMENT	SOURCE	LOAD	FRACTION OF	LOAD TO SPACE	
SCHEDULE DHW_CAFE	TYPE HOT-WATER	(BTU/HR) 297500.0	SENSIBLE 0.10	LATENT 0.20	
INTERIOR SURFACES (U-VAL	UE INCLUDES BOTH AIR	FILMS)	U-VALUE		
SURFACE	AREA (SOFT) CONSTRI 2000.00 ORESWA	UCTION (BTU/HR		NT SPACE SURFACE-TYF QUICK AIF	
EXTERIOR SURFACES (U-VAL				_	
SURFACE MU	AREA LTIPLIER (SQFT) 1.0 1050.00 1.0 150.00	(FT) (15.00 70	GHT FT) CONSTRUC' .00 ROOFCON .00 WALL_CON	U-VALUE FION (BTU/HR-SOFT-F) 0.075 0.180	SURFACE TYPE QUICK QUICK
SURFACE	AZIMUTH TILT (DEG) (DEG) 0.0 0.0 0.0 0.0	0.00		LOCATION OF ORIGIN SPACE COORDINATES X (FT) Y (FT) 0.00 0.00 0.00 0.00	Z (FT) 0.00 0.00
UNDERGROUND SURFACES (U- SURFACE MU	VALUE INCLUDES INSIDE AREA ULTIPLIER (SOFT) 1.0 1050.00	AIR FILM) CONSTRUCTION FLOORCON	U-VALUE (BTU/HR-SQFT-F) 0.10		

EMC ENGI DENVER, REPORT- LV-C DETAI	NEERS INC. CO 80227 LS OF SPACE	EZDOE - EL	ITE SOFTWARE	DEVELOPMENT	INC D	OE-2.1D 11/28/1995	15:32:37 LDL RUN 1
DATA FOR SPACE LOCATION OF ORIGINAL BUILDING COORDINAL	GYM I IN ES SP	ACE					
XB (FT) YB (FT) 0.00 0.00	ZB (FT) (D 0.00 0	UTH EG) N .00	SPACE MULTIPLIER 1.0	1	HEIGHT (FT) 25.00	AREA (SQFT) 8150.00	VOLUME (CUFT) 203750.00
TOTAL NUM NUMBER EX OF SURFACES SU 6	BER OF NUMBER OF ITERIOR INTERIOR RFACES SURFACES 4 1	SURFACE	ND OIN	DAYLIGHTING NO	SUNSPACE NO		
NUMBER OF SUBSURFA EXTERIOR TOTAL WINDOWS 0 0	CES DOORS WINDOWS 0 0						
FLOOR WEIGHT (LB/SQFT) 70.0	CALCULAT TEMPERAT (F 4	JRE)					
INFILTRATION SCHEDULE GYM INFL	INFILTRAT CALCULATI METHOD AIR-CHANG	ИС	FLOW RATE (CFM/SQFT) 0.00	AIR CI PEI	HANGES R HOUR 1.00	HEIGHT TO NEUTRAL ZONE (FT) 0.0	
PEOPLE	••••						
SCHEDULE FULL_OFF	NUM 7	BER 5.0	AREA PER PERSON (SQFT) 108.7	AC"	PEOPLE FIVITY FU/HR) 0.0	PEOPLE SENSIBLE (BTU/HR) 400.0	PEOPLE LATENT (BTU/HR) 800.0
EMC ENGI DENVER, REPORT- LV-C DETAI LIGHTING	NEERS INC. CO 80227 LS OF SPACE		LOAD	DEVELOPMENT		OE-2.1D 11/28/1995 IG DELTA, AK FRACTION	15:32:37 LDL RUN 1
SCHEDULE FULL_OFF	TYPE	ING LUOR-RV	(WATTS/ SQFT) 0.50		LOAD (KW) 0.00	OF LOAD TO SPACE 1.00	
INTERIOR SURFACES	(U-VALUE INCLUDES B	OTH AIR FILMS)		U-VALUE			
SURFACE	AREA (SOFT) 2000.00	CONSTRUCTION ORESWALL	N (BTU/HR	R-SOFT-F) 20.000	ADJACENT ADJ_TO_GY	SPACE SURFACE-TYPE M QUICK AIR	
EXTERIOR SURFACES	(U-VALUE EXCLUDES O					U-VALUE	
SURFACE	MULTIPLIER 1.0 1.0 1.0 1.0	AREA (SQFT) 6935.00 2500.00 100.00 1640.00	73.00 95 100.00 25 5.00 20	GHT (FT) 5.00 5.00 0.00 0.00	CONSTRUCTIO ROOFCON WALL CON WALL CON WALL CON	N (BTU/HR-SQFT-F) 0.075 0.180 0.180 0.180	SURFACE TYPE QUICK QUICK QUICK QUICK
		Ī	LOCATION OF C	RIGIN IN		LOCATION OF ORIGIN SPACE COORDINATES	IN
SURFACE	(DEG) (1 0.0 0.0 180.0	rilt -	XB (FT) YB 0.00 0.00 0.00	(FT) ZB (FT) 0.00 0.00 0.00 0.00 0.00 0.00 0.00	00 00 00		Z (FT) 0.00 0.00 0.00 0.00
UNDERGROUND SURFAC	ES (U-VALUE INCLUDE	INSIDE AIR E	FILM)	** *	/ALUE		
	MULTIPLIER	AREA (SQFT) CO	ONSTRUCTION	(BTU/HR-SQ	20TUD		

EMC ENGINEERS DENVER, CO REPORT- LV-C DETAILS OF	INC. EZI 80227 SPACE	OOE - ELITE SOFTWAR	RE DEVELOPMENT INC ADJ_TO_GYM	DOE-2.1D 11/28/1995 BIG DELTA, AK	15:32:37 LDL RUN 1
DATA FOR SPACE ADJ_TO	_GYM				
LOCATION OF ORIGIN IN BUILDING COORDINATES XB (FT) YB (FT) ZB (F 0.00 0.00 0.	SPACE AZIMUTH T) (DEG) 00 0.00	SPACE MULTIPLIER 1.0	HEIGHT (FT) 9.00	AREA (SOFT) 7097.00	VOLUME (CUFT) 63873.00
TOTAL NUMBER OF NUMBER OF SURFACES SURFACES 5	NUMBER OF INTERIOR UN SURFACES 1	NUMBER OF IDERGROUND SURFACES 1	DAYLIGHTING SUNSPAC		
NUMBER OF SUBSURFACES EXTERIOR TOTAL WINDOWS DOOR	INTERIOR S WINDOWS				
FLOOR WEIGHT (LB/SQFT) 70.0	CALCULATION TEMPERATURE (F) 45.0				
INFILTRATION SCHEDULE GYM_INFL	INFILTRATION CALCULATION METHOD AIR-CHANGE	FLOW RATE (CFM/SQFT) 0.00	AIR CHANGES PER HOUR 1.00	HEIGHT TO NEUTRAL ZONE (FT) 0.0	
PEOPLE					PEOPLE
SCHEDULE FULL_OFF	NUMBER 35.0	PERSON (SOFT) 202.8	PEOPLE ACTIVITY (BTU/HR) 0.0	SENSIBLE (BTU/HR) 400.0	PEOPLE LATENT (BTU/HR) 800.0
EMC ENGINEERS DENVER, CO REPORT- LV-C DETAILS OF	INC. EZD 80227 SPACE	OE - ELITE SOFTWAR		DOE-2.1D 11/28/1995 BIG DELTA, AK	15:32:37 LDL RUN 1
LIGHTING		LOAD		FRACTION	
SCHEDULE FULL_OFF	LIGHTING TYPE REC-FLUOR-R	(WATTS/ SQFT) V 0.60	LOAD (KW) 0.00	FRACTION OF LOAD TO SPACE 1.00	
OTHER EQUIPMENT			FRACTION OF	LOAD TO SPACE	
SCHEDULE DHW GYM	SOURCE TYPE HOT-WATER	LOAD (BTU/HR) 28000.0	SENSIBLE 0.00	LATENT 0.10	
INTERIOR SURFACES (U-VALU	JE INCLUDES BOTH AI		U-VALUE		
SURFACE	AREA (SOFT) CONS 2000.00 ORES	TRUCTION (BTU/		NT SPACE SURFACE-TYP QUICK AIR	E
EXTERIOR SURFACES (U-VALU				U-VALUE	
SURFACE MUI	AR TIPLIER (SOFT 1.0 6935. 1.0 522. 1.0 868. 1.0 1350. 1.0 135.	EA WIDTH H) (FT) 00 73.00 00 58.00 50 96.50 00 150.00 00 15.00	EIGHT (FT) CONSTRUC 95.00 ROOFCON 9.00 WALL CON 9.00 WALL CON 9.00 WALL CON 9.00 WALL CON	U-VALUE TION (BTU/HR-SQFT-F) 0.075 0.180 0.180 0.180 0.180	SURFACE TYPE QUICK QUICK QUICK QUICK QUICK QUICK QUICK QUICK
		LOCATION OF	ORIGIN IN ORDINATES	LOCATION OF ORIGIN	IN
SURFACE	AZIMUTH TILT (DEG) 0.0 0.0 0.0 90.0 90.0 90.0 270.0 90.0		B (FT) ZB (FT) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	X (FT) Y (FT) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	Z (FT) 0.00 0.00 0.00 0.00 0.00
EMC ENGINEERS DENVER, CO REPORT- LV-C DETAILS OF S	INC. EZD 80227 PACE	DE - ELITE SOFTWAR A	E DEVELOPMENT INC DJ_TO_GYM	DOE-2.1D 11/28/1995 BIG DELTA, AK	15:32:37 LDL RUN 1
UNDERGROUND SURFACES (U-V SURFACE MUI	ALUE INCLUDES INSI ARE TIPLIER (SOFT 1.0 6935.0	DE AIR FILM) A CONSTRUCTION	U- VA LUE		

REPORT- LV-C DETAILS OF SPA	INC. EZDOR 80227 ACE	E - ELITE SOFTWARE	DEVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	15:32:37 LDL RUN 1
DATA FOR SPACE DINAMP					
LOCATION OF ORIGIN IN BUILDING COORDINATES	SPACE				
XB (FT) YB (FT) ZB (FT) 0.00	AZIMUTH (DEG) 0.00	SPACE MULTIPLIER 1.0	HEIGHT (FT) 20.00	AREA (SQFT) 4900.00	VOLUME (CUFT) 98000.00
TOTAL NUMBER OF NUMBER EXTERIOR OF SURFACES SURFACES 3	NUMBER OF M	MBER OF ERGROUND	DAYLIGHTING SUNSPACE NO NO		
NUMBER OF SUBSURFACES EXTERIOR TOTAL WINDOWS DOORS 0 0 0	INTERIOR WINDOWS 0				
FLOOR WEIGHT (LB/SQFT) 70.0	CALCULATION TEMPERATURE (F) 45.0				
INFILTRATION	INFILTRATION			HEIGHT TO	
SCHEDULE INFL_ACTIV	CALCULATION METHOD AIR-CHANGE	FLOW RATE (CFM/SQFT) 0.00	AIR CHANGES PER HOUR 1.00	NEUTRAL ZONE (FT) 0.0	
PEOPLE		ADEA DED	יו זמסממ	PEOPLE	DEODLE
SCHEDULE FULL OFF	NUMBER 150.0	AREA PER PERSON (SQFT) 32.7	PEOPLE ACTIVITY (BTU/HR) 0.0	SENSIBLE (BTU/HR) 0.0	PEOPLE LATENT (BTU/HR) 0.0
DENVER, CO REPORT- LV-C DETAILS OF SPA	CE	DII	N&MP	DOE-2.1D 11/28/1995 BIG DELTA, AK FRACTION	15:32:37 LDL RUN 1
	TOUTTNO	(WATTS/	מגסז		
SCHEDULE FULL_OFF	LIGHTING TYPE REC-FLUOR-RV	SQFT) 0.75	LOAD (KW) 0.00	OF LOAD TO SPACE 1.00	
	INCLUDES BOTH AIR		(KW) 0.00	OF LOAD TO SPACE	
FULL_OFF INTERIOR SURFACES (U-VALUE : SURFACE (SG 20)		FILMS) UCTION (BTU/HF LL	U-VALUE R-SOFT-F) ADJACEN	OF LOAD TO SPACE 1.00 IT SPACE SURFACE-TYPE OR C OUICK AIR	2
FULL_OFF INTERIOR SURFACES (U-VALUE : SURFACE (SG 20)	AREA OFT) CONSTR 00.00 ORESWA 00.00 ORESWA	FILMS) UCTION (BTU/HF LL LL	U-VALUE R-SOFT-F) ADJACEN 20.000 INTERIO	OF LOAD TO SPACE 1.00 NT SPACE SURFACE-TYPE OR C QUICK AIR QUICK AIR	5
FULL_OFF INTERIOR SURFACES (U-VALUE : SURFACE (SG 200 200 200 200 200 200 200 200 200 20	INCLUDES BOTH AIR AREA OFT) CONSTR 00.00 ORESWA 00.00 ORESWA EXCLUDES OUTSIDE A AREA	FILMS) UCTION (BTU/HF LL LL IR FILM) WIDTH HEI (FT) 70.00 70 70.00 70	U-VALUE R-SOFT-F) ADJACEN 20.000 INTERIO 20.000 KITCHEN IGHT (FT) CONSTRUCT 10.00 ROOPCON	OF LOAD TO SPACE 1.00 NT SPACE SURFACE-TYPE OR C QUICK AIR U-VALUE U-VALUE TION (BTU/HR-SQFT-F)	SURFACE TYPE QUICK QUICK QUICK QUICK
FULL_OFF INTERIOR SURFACES (U-VALUE : SURFACE (SS 200 200 200 200 200 200 200 200 200 2	AREA OFT) CONSTR 00.00 ORESWA EXCLUDES OUTSIDE A PLIER (SOFT) 1.0 4900.00 1.0 1400.00	FILMS) UCTION (BTU/HF LL LL IR FILM) WIDTH HEI (FT) 70.00 70 70.00 20 70.00 20	U-VALUE R-SOFT-F) ADJACEN 20.000 INTERIO 20.000 KITCHEN IGHT (FT) CONSTRUCT 1.000 ROOFCON 0.00 WALL_CON 0.00 WALL_CON	OF LOAD TO SPACE 1.00 NT SPACE SURFACE-TYPE OF QUICK AIR OF QUICK AIR U-VALUE FION (BTU/HR-SOFT-F) 0.180 0.180 LOCATION OF ORIGIN	SURFACE TYPE QUICK QUICK QUICK
FULL_OFF INTERIOR SURFACES (U-VALUE : SURFACE (SG 200 200 200 200 200 200 200 200 200 20	AREA OFT) CONSTR 00.00 ORESWA 00.00 ORESWA EXCLUDES OUTSIDE A PLIER (SOFT) 1.0 4900.00 1.0 1400.00	FILMS) UCTION (BTU/HF LL IR FILM) WIDTH HEJ (FT) 70.00 70 70.00 20 70.00 20 LOCATION OF C BUILDING COOF	U-VALUE R-SOFT-F) ADJACEN 20.000 INTERIO 20.000 KITCHEN IGHT (FT) CONSTRUCT (FT) CONSTRUCT 0.00 ROOFCON 0.00 WALL CON	OF LOAD TO SPACE 1.00 NT SPACE SURFACE-TYPE OF COURT AIR U-VALUE FION (BTU/HR-SOFT-F) 0.180 0.180 LOCATION OF ORIGIN SPACE COORDINATES	SURFACE TYPE OUICK QUICK QUICK IN 2 (FT) 0.00 0.00
FULL_OFF INTERIOR SURFACES (U-VALUE : SURFACE (SG 200 200 200 200 200 200 200 200 200 20	AREA CONSTR OCC OCC	FILMS) UCTION (BTU/HF LL LL IR FILM) WIDTH HEI (FT) 70.00 70 70.00 20 10.00 20 LOCATION OF C BUILDING COOF XB (FT) YB 0.00 0.00 0.00 0.00 AIR FILM)	U-VALUE R-SOFT-F) ADJACEN 20.000 INTERIO 20.000 KITCHEN IGHT (FT) CONSTRUCT 1.000 ROOFCON 0.00 WALL_CON 0.00 WALL_CON	OF LOAD TO SPACE 1.00 NT SPACE SURFACE-TYPE OF COURT AIR U-VALUE FION (BTU/HR-SOFT-F) 0.180 0.180 LOCATION OF ORIGIN SPACE COORDINATES	SURFACE TYPE QUICK QUICK QUICK IN Z (FT) 0.00

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EMC ENGINEERS INC. EZDOE - ELITE SOFTW.
DENVER, CO 80227
REPORT- LV-G DETAILS OF SCHEDULES OCCURRING IN THE PROJECT
                    EZDOE - ELITE SOFTWARE DEVELOPMENT INC
                                          DOE-2.1D 11/28/1995
                                                     15:32:37 LDL RUN 1
                                          BIG DELTA, AK
                   ( NON DIMENSIONLESS SCHEDULES ARE GIVEN IN ENGLISH UNITS )
NUMBER OF SCHEDULES 10
 SCHEDULE FULL OFF
   THROUGH 31 12
     FOR DAYS SUN MON TUE WED THU FRI SAT HOL
     SCHEDULE OCCUP
    THROUGH 5 6
     FOR DAYS SUN SAT HOL
    FOR DAYS MON TUE WED THU FRI
     THROUGH 25 8
      FOR DAYS SUN MON TUE WED THU FRI SAT HOL
     THROUGH 31 12
EMC ENGINEERS INC. EZDOE - ELITE SOFTW/
DENVER, CO 80227
REPORT- LV-G DETAILS OF SCHEDULES OCCURRING IN THE PROJECT
                                          DOE-2.1D 11/28/1995
                                                      15:32:37 LDL RUN 1
                  EZDOE - ELITE SOFTWARE DEVELOPMENT INC
                                          BIG DELTA, AK
     FOR DAYS SUN SAT HOL
    FOR DAYS MON TUE WED THU FRI
    HOUR 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 0.00 0.00 0.00 0.00 0.00 0.00 0.10 1.00 1.00 1.00 0.80 0.30 1.00 1.00 0.30 0.10 0.10 0.10 0.40 0.40 0.20 0.00 0.00 0.00
  SCHEDULE LIGHT ON
    THROUGH 5 6
     FOR DAYS SUN SAT HOL
    FOR DAYS MON TUE WED THU FRI
     THROUGH 25 8
     THROUGH 31 12
                   EZDOE - ELITE SOFTWARE DEVELOPMENT INC
                                          DOE-2.1D 11/28/1995
                                                     15:32:37 LDL RUN 1
      ENGINEERS
DENVER,
REPORT- LV-G
DETAILS OF SCHEDULES OCCURRING IN THE PROJECT
                                          BIG DELTA, AK
    FOR DAYS MON TUE WED THU FRI
    SCHEDULE DHW CLASS
    THROUGH 5 6
     FOR DAYS SUN SAT HOL
     FOR DAYS MON TUE WED THU FRI
    THROUGH 25 8
      FOR DAYS SUN MON TUE WED THU FRI SAT HOL
     THROUGH 31 12
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15:32:37 LDL RUN 1
EMC ENGINEERS INC. EZDOE - ELITE SOFTW
DENVER, CO 80227
REPORT- LV-G DETAILS OF SCHEDULES OCCURRING IN THE PROJECT
                                              EZDOE - ELITE SOFTWARE DEVELOPMENT INC
                                                                                                   DOE-2.1D 11/28/1995
                                                                                                    BIG DELTA, AK
             FOR DAYS SUN SAT HOL
        FOR DAYS MON TUE WED THU FRI
         SCHEDULE DHW_GYM
         THROUGH 5 6
        FOR DAYS SUN SAT HOL HOUR 1 2
            FOR DAYS MON TUE WED THU FRI
            THROUGH 25 8
             FOR DAYS SUN MON TUE WED THU FRI SAT HOL
            THROUGH 31 12
                                                                                                    DOE-2.1D 11/28/1995 15:32:37 LDL RUN 1
EMC ENGINEERS INC. EZDOE - ELITE SOFTWI
DENVER, CO 80227
REPORT- LV-G DETAILS OF SCHEDULES OCCURRING IN THE PROJECT
                                            EZDOE - ELITE SOFTWARE DEVELOPMENT INC
                                                                                                    BIG DELTA, AK
         FOR DAYS MON TUE WED THU FRI
             SCHEDULE DHW_CAFE
         THROUGH 5 6
              FOR DAYS SUN SAT HOL
         FOR DAYS MON TUE WED THU FRI
         THROUGH 25 8
         FOR DAYS SUN MON TUE WED THU FRI SAT HOL HOUR 1 2 3 4
             THROUGH 31 12
                                                                                                                                15:32:37 LDL RUN 1
                                               EZDOE - ELITE SOFTWARE DEVELOPMENT INC
                                                                                                    DOE-2.1D 11/28/1995
               ENGINEERS INC. EZDOE - ELITE SOFTW.
CO 80227
DETAILS OF SCHEDULES OCCURRING IN THE PROJECT
EMC
DENVER,
REPORT- LV-G
                                                                                                    BIG DELTA, AK
              FOR DAYS SUN SAT HOL
          FOR DAYS MON TUE WED THU FRI
             SCHEDULE GYM_LIGHT
          THROUGH 5 6
              FOR DAYS SUN SAT HOL
             FOR DAYS MON TUE WED THU FRI
              \begin{smallmatrix} R & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 & 13 & 14 & 15 & 16 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 \\ 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.80 & 0.80 & 0.80 & 0.80 & 0.80 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.00 & 0.00 \\ 0.00 & 0.
          THROUGH 25 8
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THROUGH 31 12

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EMC ENGINEERS INC EZDOE - ELITE SOFTWA
DENVER CO 80227
REPORT- LV-G DETAILS OF SCHEDULES OCCURRING IN THE PROJECT
                                                                    EZDOE - ELITE SOFTWARE DEVELOPMENT INC
                                                                                                                                                       DOE-2.1D 11/28/1995
                                                                                                                                                                                                 15:32:37 LDL RUN 1
                                                                                                                                                       BIG DELTA, AK
                      FOR DAYS SUN SAT HOL
              FOR DAYS MON TUE WED THU FRI
                    SCHEDULE FULL ON
              THROUGH 31 12
                     FOR DAYS SUN MON TUE WED THU FRI SAT HOL
                    TO DATE OF HOLD THE TAIL HOLD 
       SCHEDULE INFL ACTIV
              THROUGH 5 6
              THROUGH 25 8
                     FOR DAYS SUN MON TUE WED THU FRI SAT HOL
                    THROUGH 31 12
EMC ENGINEERS INC. EZDOE - ELITE SOFTWA
DENVER, CO 80227
REPORT - LV-G DETAILS OF SCHEDULES OCCURRING IN THE PROJECT
                                                                      EZDOE - ELITE SOFTWARE DEVELOPMENT INC
                                                                                                                                                      DOE-2.1D 11/28/1995
                                                                                                                                                                                                 15:32:37 LDL RUN 1
                                                                                                                                                      BIG DELTA, AK
              SCHEDULE GYM_INFL
              THROUGH 5 6
              THROUGH 31 12
              EMC ENGINEERS INC.
DENVER, CO 80227
REPORT- LS-A SPACE PEAK LOADS SUMMARY
                                                                     EZDOE - ELITE SOFTWARE DEVELOPMENT INC
                                                                                                                                                     DOE-2.1D 11/28/1995
                                                                                                                                                                                             15:32:37 LDL RUN 1
                                                                                                                                                  BIG DELTA, AK
                                                                                                                                            HEATING LOAD
(KBTU/HR)
-269.051
-331.204
-14.365
-225.416
-124.013
-128.236
                                                           COOLING LOAD
(KBTU/HR)
97.599
307.936
24.303
84.385
59.949
                                                                                                TIME OF PEAK
14 3 PM
12 5 PM
31 1 PM
24 5 PM
14 3 PM
24 5 PM
                                                                                                                   DRY-
BULB
82.F
87.F
70.F
78.F
82.F
78.F
                                                                                                                                                                       TIME OF PEAK
JAN 23 3 PM
FEB 5 5 AM
DEC 10 11 AM
JAN 23 3 PM
FEB 5 5 AM
JAN 23 3 PM
                                                                                                                                                                                                  DRY- WET-
BULB BULB
-13.F -14.F
-44.F -44.F
-22.F -22.F
-13.F -14.F
-13.F -14.F
                                                                                                                              WET-
BULB
63.F
65.F
54.F
66.F
                                    MULTIPLIER
SPACE NAME
INTERIOR C
EXTER ZNTC
KITCHEN T
GYM
ADJ TO GYM
DINEMP
                                                                                       AUG 14
JUL 12
AUG 31
AUG 24
AUG 14
AUG 24
SUM
                                                                    622.707
                                                                                                                                                  -1092.286
BUILDING PEAK
                                                                    588.090
                                                                                       JUL 12 5 PM
                                                                                                                   87.F 65.F
                                                                                                                                                 -1050.699
                                                                                                                                                                        DEC 10 11 AM -22.F -22.F
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EMC ENGINEERS DENVER, CO PORT- LS-B SPACE PEAK LO	INC. 80227 AD COMPONENTS	EZDOE -	ELITE SOFT	WARE DEVELOPMENT INTERIOR C	I INC	BIG DELTA,	AK	5 15:32:37	LDL RON
	D COM 0112112								
ACE INTERIOR_C MULTIP FLOOR VOLUME	LIER 1 AREA 2030 1830	.0 42 SOFT 78 CUFT	FLOOR N 1890 5185	TULTIPLIER M2 M3	1.0				
TIME DRY-BULB TE WET-BULB TE	#=: MP	COOLING AUG 14 82F 63F	E LOAD 3PM 28C 17C	=		HEATING JAN 23 -13F -14F	3PM		
WALLS ROOFS GLASS CONDUCTION GLASS SOLAR DOOR INTERNAL SURFACES UNDERGROUND SURFACES OCCUPANTS TO SPACE EQUIPMENT TO SPACE EQUIPMENT TO SPACE PROCESS TO SPACE INFILTRATION TOTAL TOTAL TOTAL LOAD TOTAL LOAD	SENSI	BLE	LATE	ENT (KW)	-269.051 13.226B	SENSIF (KBTU/H) 0.0000 -91.206 0.0000 0.0000 0.0000 -62.109 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000	וששי	KW W / M2	
	* NOTE	IN CO		******	******	*****	•		
EMC ENGINEERS DENVER, CO PORT- LS-B SPACE PEAK LO	* ****** INC. 80227	EZDOE -	*****	*****		DOE-2.1D BIG DELTA	11/28/199 , AK	15:32:37	LDL RU
DACE FYTER ZN C	INC. B0227 AD COMPONENTS	EZDOE -	ELITE SOF	TWARE DEVELOPMEN EXTER_ZN_C	FT INC	DOE-2.1D BIG DELTA	11/28/199 , AK	15:32:37	LDL RUI
DACE FYTER ZN C	INC. B0227 AD COMPONENTS	EZDOE -	ELITE SOF	TWARE DEVELOPMEN EXTER_ZN_C	FT INC	DOE-2.1D BIG DELTA	11/28/199 , AK	15:32:37	LDL RUI
PACE EXTER_ZN_C MULTIF FLOOR VOLUME	INC. 80227 AD COMPONENTS COMPONENTS CLIER 1 AREA 88	EZDOE - 1.0 SOFT 161 CUFT COOLING	FLOOR 820 2250	TWARE DEVELOPMEN EXTER_ZN_C MULTIPLIER M2 M3	TT INC	DOE-2.1D BIG DELTA HEATING FEB 5 -44F	LOAD		LDL RU
PACE EXTER_ZN_C MULTIF FLOOR VOLUME	INC. 80227 AD COMPONENTS COMPONENTS CLIER 1 AREA 88	EZDOE - S 1.0 SOFT 161 CUFT COOLING 87F 65F IBLE (KW) 16.892 11.326 19.140 0.000	FLOOR 820 2250 18C LAT (KBTU/H)	TWARE DEVELOPMEN EXTER_ZN_C MULTIPLIER M2 M3 = ENT (KW) -0.000 0.000	-331.204 37.5131	HEATING -44F -44F -44F -44F -44F -59 (594 -133 .994 -133 .994 -133 .994 -133 .994 -133 .994 -130 .000 0.000 0.000 0.000 0.000 0.000 0.000 -10.214	LOAD -42C -42C BLE -17.483 -39.243 -39.243 -39.171 0.000 0.000 0.000 0.000 0.000 0.000 -2.991 -97.002 118.260	÷.	LDL RU

EMC ENGINEERS DENVER, CO EPORT- LS-B SPACE PEAK LOA	80227	C - ELITE SOFTWARE DEVELOPM KITCHEN	ENT INC			15:32:37	LDL RUN :
PACE KITCHEN							
MULTIPL FLOOR VOLUME		FLOOR MULTIPLIER FT 85 M2 FT 232 M3	1.0				
TIME DRY-BULB TEM WET-BULB TEM	AUG 70F	ING LOAD ========== 31 1PM 21C 12C	==:	HEATING ======== DEC 10 1 -22F -22F	.1AM -30C		
	(KBTU/H) (KW	LATENT) (KBTU/H) (KW)	(1	SENSIB KBTU/H) (LE KW)		
WALLS ROOFS GLASS CONDUCTION GLASS SOLAR DOOR INTERNAL SURFACES UNDERGROUND SURFACES OCCUPANTS TO SPACE LIGHT TO SPACE EQUIPMENT TO SPACE EQUIPMENT TO SPACE INFILTRATION	0.000 0.00 5.208 1.52 0.000 0.00 0.000 0.00 0.000 0.00 0.000 0.00 -0.060 -0.01 0.000 0.00 0.000 0.00 0.000 0.00 0.000 0.00 19.155 5.61	12C LATENT (KBTU/H) (KW)		0.000 -7.288 0.000 0.000 0.000 -2.294 0.000 0.000 0.000 0.000 0.000 0.000	0.000 -2.134 0.000 0.000 0.000 -0.672 0.000 0.000 0.000 0.000		
TOTAL TOTAL LOAD TOTAL LOAD / AREA	24.303 7.118 77.853 KBTU/H 85.55BTU/H.SQFT	B 53.550 15.683 22.801 KW F 269.702 W / M2	-14.365 KBT 15.786BTU/	-14.365 TU/H 'H.SQFT	-4.207 -4.207 49.764	KW W / M2	
	HOLE I) THE	E ABOVE LOADS EXCLUDE OUTSI	IDE VENTILATION	AIR *			
PMC DVOLUME	* 2) TIN	DESCRIPTION OF THE CONSIDERATION	*******	*******			
EMC ENGINEERS DENVER, CO PORT- LS-B SPACE PEAK LOAD	* 2) TIN	*******	*******	*******	11/28/1995 AK	5 15:32:37	LDL RUN 1
CE GYM	* 2)TIN * IN * ******************************	- ELITE SOFTWARE DEVELOPME GYM	ENT INC D	*******	11/28/1995 AK	5 15:32:37	LDL RUN 1
CE GYM	* 2)TIN * 1N * 1N * EZDOE 80227 COMPONENTS ER 810 REA 8150 203750 CUF	- ELITE SOFTWARE DEVELOPME GYM FLOOR MULTIPLIER T 757 M2 T 7570 M3	ENT INC D	OE-2.1D :	11/28/1995 AK	15:32:37	LDL RUN
CE GYM MULTIPLI FLOOR AI VOLUME TIME	INC. EZDOE 80227 COMPONENTS ERA 8150 SOF 203750 CUF COOLI	- ELITE SOFTWARE DEVELOPME GYM FLOOR MULTIPLIER T 757 M2 T 5770 M3 NG LOAD	ENT INC D	DE-2.1D : GIG DELTA, HEATING JAN 23 3-13F -14F	LOAD LOAD LOAD LOAD LOAD LOAD LOAD LOAD	5 15:32:37	LDL RUN :
ACE GYM MULTIPLI FLOOR AI VOLUME TIME	INC. EZDOE 80227 COMPONENTS ERA 8150 SOF 203750 CUF COOLI	- ELITE SOFTWARE DEVELOPME GYM FLOOR MULTIPLIER T 757 M2 T 5770 M3 NG LOAD	ENT INC D	HEATING HEATING JAN 23 3 -13F -14F SENSIBL BTU/H) (-44.617 30.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	LOAD LOAD LOAD LOAD LOAD LOAD LOAD LOAD	15:32:37	LDL RUN
CE GYM MULTIPLI FLOOR AI VOLUME TIME DRY-BULB TEMP WET-BULB TEMP WET-BULB TEMP WET-BULB TEMP WET-BULB TEMP WET-BULB TEMP WET-BULB TEMP WALLS ROOFS GLASS CONDUCTION GLASS SOLAR DOOR INTERNAL SURFACES UNDERGROUND SURFACES INFILTRATION TOTAL TOTAL TOTAL TOTAL LOAD	* 2) TIN * 1NC. 80227 COMPONENTS ER 8150 SOF 203750 CUF	- ELITE SOFTWARE DEVELOPME GYM T FLOOR MULTIPLIER T 757 M2 5770 M3 NG LOAD	ENT INC D 1.0	HEATING HEATING JAN 23 3-13F -14F SENSIBLETU/H) (-144.617 -145 -145 -146 -146 -146 -146 -146 -146 -146 -146	LOAD LOAD LOAD LOAD LOAD LOAD LOAD LOAD	5 15:32:37	LDL RUN

EMC ENGINEERS DENVER, CO EPORT- LS-B SPACE PEAK LO	INC. EZ	DOE - ELITE SOF	THERE DEVELOTIBLE	1 INC	DOL 1.10	,,,	5 15:32:37	TOT KON .
EPORT- LS-B SPACE PEAK LO.	AD COMPONENTS		ADJ_TO_GYM		BIG DELTA	, AK		
PACE ADJ_TO_GYM								
MULTIP	LIER 1.0	FLOOR 659	MULTIPLIER M2 M3	1.0				
VOLUME	63873	CÜFT 1809	M3					
	=====	OOLING LOAD	=	=	HEATING			
TIME DRY-BULB TE WET-BULB TE	MP MP	UG 14 3PM 82F 28C 63F 17C			FEB 5 -44F -44F	-42C -42C		
	SENSIBLE (KBTU/H) (KW) (KBTU/H)	ENT (KW)		SENSII (KBTU/H)	SLE (KW)		
WALLS	26.811 7	.852 0.000	0.000		-44.374	-12.996		
ROOFS GLASS CONDUCTION	0.000 0	.000 0.000	0.000		0.000	0.000		
DOOR INTERNAL SUPFACES	0.000 0	.000 0.000	0.000		0.000	0.000		
UNDERGROUND SURFACES OCCUPANTS TO SPACE	-0.398 -0 0.000 0	.117 0.000 .000 0.000	0.000 0.000		-24.577 0.000	-7.198 0.000		
LIGHT TO SPACE EQUIPMENT TO SPACE	0.000 0	.000 0.000	0.000 0.000		0.000	0.000		
PROCESS TO SPACE INFILTRATION	0.000 0 1.375 0	.000 0.000 .403 0.000	0.000 0.000		-8.210	-2.405		
WALLS ROOPS GLASS CONDUCTION GLASS SOLAR DOOR INTERNAL SURFACES UNDERGROUND SURFACES OCCUPANTS TO SPACE LIGHT TO SPACE EQUIPMENT TO SPACE EQUIPMENT TO SPACE INFILTRATION TOTAL TOTAL LOAD TOTAL LOAD TOTAL LOAD / AREA	59.949 17 59.949 KBTU/ 8.45BTU/H.	.558 0.000 H 17.558 SOFT 26.629	0.000 KW W / M2	-124.013 KI	-124.013 3TU/H J/H.SOFT	-36.320 -36.320 55.087	KW W / M2	
	******	*****	*****	******	******	*		
	* NOTE 1) THE ABOVE LOAD	S EXCLUDE OUTSIDE	E VENTILATIO	NAIR	*		
	*	TIMES GIVEN IN	S EXCLUDE OUTSIDE S STANDARD TIME FOON	OR THE LOCAT	ION	*		
	* 2 * * *		ON			*		
	******	*****	*****	*****	*****	*		
EMC ENGINEERS	******	*****	*****	*****	*****	* * 11/28/199	5 15:32:37	LDL RUN
EMC ENGINEERS DENVER, DEPORT- LS-B SPACE PEAK LO	******	*****	*****	*****	*****	11/28/199 , AK	5 15:32:37	LDL RUN
EMC ENGINEERS DENVER, CO EPORT- LS-B SPACE PEAK LO	******	*****	*****	*****	*****	11/28/199 , AK	5 15:32:37	LDL RUN
PACE DIN&MP	INC. EZ. 80227 AD COMPONENTS	DOE - ELITE SOP	TWARE DEVELOPMENT	T INC	*****	11/28/199 , AK	5 15:32:37	LDL RUN
PACE DIN&MP	INC. EZ. 80227 AD COMPONENTS LIER 1.0 AREA 4900 98000	DOE - ELITE SOF FLOOR SOFT 455 CUFT 2775	*****	T INC	DOE-2.1D BIG DELTA HEATING	LOAD	5 15:32:37	LDL RUN
PACE DIN&MP MULTIP FLOOR VOLUME	INC. EZ. 80227 AD COMPONENTS LIER 1.0 AREA 4900 98000	DOE - ELITE SOF FLOOR SOFT 455 CUFT 2775	TWARE DEVELOPMENT DIN&MP MULTIPLIER M2 M3	T INC	DOE-2.1D BIG DELTA HEATING	LOAD	5 15:32:37	LDL RUN
PACE DIN&MP MULTIP FLOOR VOLUME TIME DRY-BULB TE WET-BULB TE	INC. EZ. 80227 AD COMPONENTS LIER 1.0 AREA 4900 98000 C E==== A	DOE - ELITE SOP FLOOR SOFT 455 CUFT 2775 COLING LOAD UG 24 5PM 78F 26C 66F 19C	TWARE DEVELOPMENT DIN&MP MULTIPLIER M2 M3	T INC	DOE-2.1D BIG DELTA HEATING	LOAD	5 15:32:37	LDL RUN
PACE DIN&MP MULTIP FLOOR VOLUME TIME DRY-BULB TE WET-BULB TE	INC. EZ. 80227 AD COMPONENTS LIER 1.0 AREA 4900 98000 C E==== A	DOE - ELITE SOP FLOOR SOFT 455 CUFT 2775 COLING LOAD UG 24 5PM 78F 26C 66F 19C	TWARE DEVELOPMENT DIN&MP MULTIPLIER M2 M3	T INC	DOE-2.1D BIG DELTA HEATING JAN 23 -13F -14F	LOAD 3PM -25C -26C	5 15:32:37	LDL RUN
PACE DIN&MP MULTIP FLOOR VOLUME TIME DRY-BULB TE	INC. EZ. 80227 AD COMPONENTS LIER 1.0 AREA 4900 98000 CC AMP MP MP SENSIBLE (KBTU/H) (DOE - ELITE SOF SOFT 455 CUFT 2775 COLING LOAD UG 24 5PM 78F 26C 66F 19C KW) (KBTU/H)	TWARE DEVELOPMENT DIN&MP MULTIPLIER M2 M3 =	T INC	DOE-2.1D BIG DELTA HEATING JAN 23 -13F -14F SENSII	LOAD 3PM -25C -26C -26C BLE (KW)	5 15:32:37	LDL RUN
PACE DIN&MP MULTIP FLOOR VOLUME TIME DRY-BULB TE	INC. EZ. 80227 AD COMPONENTS LIER 1.0 AREA 4900 98000 CC AMP MP MP SENSIBLE (KBTU/H) (DOE - ELITE SOF SOFT 455 CUFT 2775 COLING LOAD UG 24 5PM 78F 26C 66F 19C KW) (KBTU/H)	TWARE DEVELOPMENT DIN&MP MULTIPLIER M2 M3 =	T INC	DOE-2.1D BIG DELTA HEATING JAN 23 -13F -14F (KBTU/H) -29.546 -21.855 0.000	LOAD 3PM -25C -26C BLE (KW) -8.653 -6.401 0.000	5 15:32:37	LDL RUN
PACE DIN&MP MULTIP FLOOR VOLUME TIME DRY-BULB TE	INC. EZ. 80227 AD COMPONENTS LIER 1.0 AREA 4900 98000 CC AMP MP MP SENSIBLE (KBTU/H) (DOE - ELITE SOF SOFT 455 CUFT 2775 COLING LOAD UG 24 5PM 78F 26C 66F 19C KW) (KBTU/H)	TWARE DEVELOPMENT DIN&MP MULTIPLIER M2 M3 =	T INC	DOE-2.1D BIG DELTA HEATING JAN 23 -13F -14F SENSII (KBTU/H) -29.546 -21.855 0.000 0.000	LOAD 3PM -25C -26C BLE (KW) -8.653 -6.401 0.000 0.00	5 15:32:37	LDL RUN
PACE DIN&MP MULTIP FLOOR VOLUME TIME DRY-BULB TE	INC. EZ. 80227 AD COMPONENTS LIER 1.0 AREA 4900 98000 CC AMP MP MP SENSIBLE (KBTU/H) (DOE - ELITE SOF SOFT 455 CUFT 2775 COLING LOAD UG 24 5PM 78F 26C 66F 19C KW) (KBTU/H)	TWARE DEVELOPMENT DIN&MP MULTIPLIER M2 M3 =	T INC	DOE-2.1D BIG DELTA HEATING JAN 23 -13F -14F SENSII (KBTU/H) -29.546 -21.855 0.000 0.000	LOAD 3PM -25C -26C BLE (KW) -8.653 -6.401 0.000 0.00	5 15:32:37	LDL RUN
PACE DIN&MP MULTIP. FLOOR VOLUME TIME DRY-BULB TE WET-BULB TE WE	INC. 80227 AD COMPONENTS LIER 1.0 AREA 4900 98000 C SENSIBLE (KBTU/H) (12.806 3 0.000 0 0.000 0 0.000 0 0.000 0 0.000 0 0.000 0 0.000 0 0.000 0 0.000 0 0.000 0 0.000 0 0.000 0 0.000 0	DOE - ELITE SOF SOFT 455 CUFT 2775 COOLING LOAD UG 24 5PM 78F 26C 66F 19C KW) (KETU/H)	TWARE DEVELOPMENT DIN&MP MULTIPLIER M2 M3	T INC	DOE-2.1D BIG DELTA HEATING JAN 23 -13F -14F SENSII (KBTU/H) -29.546 -21.855 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	LOAD -25C -26C -26C -26C -26C -8.653 -6.401 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	5 15:32:37	LDL RUN
PACE DIN&MP MULTIP, FLOOR VOLUME TIME DRY-BULB TE WET-BULB TE WET-BULB TE WET-BULB TE UNDERSOLAR DOOR INTERNAL SURFACES UNDERGROUND SURFACES OCCUPANTS TO SPACE	INC. 80227 AD COMPONENTS LIER 1.0 AREA 4900 98000 SENSIBLE (KBTU/H) (12.806 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DOE - ELITE SOF SOFT 455 CUFT 275 COLING LOAD BUG 24 5PM 78F 26C 66F 19C KW) (KBTU/H)	TWARE DEVELOPMENT DIN&MP MULTIPLIER M2 M3 (KW) 0.000	T INC 1.0	DOE-2.1D BIG DELTA HEATING JAN 23 -13F -14F SENSII (KBTU/H) -29.546 -21.855 0.000 0.000 0.000 -14.882 0.000	LOAD 3PM -25C -26C BLE (KW) -8.653 -6.401 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	5 15:32:37	LDL RUN
PACE DIN&MP MULTIP, FLOOR VOLUME TIME DRY-BULB TE WET-BULB TE WET-BULB TE WALLS ROOFS GLASS CONDUCTION GLASS SOLAR DOOR INTERNAL SURFACES UNDERGROUND SURFACES OCCUPANTS TO SPACE LIGHT TO SPACE EQUIPMENT TO SPACE PROCESS TO SPACE INFILTRATION TOTAL TOTAL TOTAL TOTAL TOTAL LOAD	INC. 80227 AD COMPONENTS LIER 1.0 AREA 4900 98000 SENSIBLE (KBTU/H) (12.806 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DOE - ELITE SOF SOFT 455 CUFT 275 COLING LOAD 1024 5PM 78F 26C 66F 19C KW) (KBTU/H) 528 0.000	TWARE DEVELOPMENT DIN&MP MULTIPLIER M2 M3 (KW) 0.000	T INC	DOE-2.1D BIG DELTA HEATING JAN 23 -13F -14F SENSII (KBTU/H) -29.546 -21.855 0.000 0.000 0.000 0.000 -14.882 0.000 0.000 0.000 0.000 -61.953	LOAD -25C -26C BLE (KW) -8.653 -6.401 0.000 0.000 0.000 -4.359 0.000 0.000 0.000 -18.144 -37.557		LDL RUN
PACE DIN&MP MULTIP, FLOOR VOLUME TIME DRY-BULB TE WET-BULB TE WET-BULB TE WET-BULB TE WET-BULB TE UNDERGOON GLASS CONDUCTION GLASS SOLAR DOOR INTERNAL SURFACES UNDERGROUND SURFACES OCCUPANTS TO SPACE LIGHT TO SPACE EQUIPMENT TO SPACE EQUIPMENT TO SPACE INFILTRATION TOTAL	INC. EZ. 80227 AD COMPONENTS LIER 1.0 AREA 4900 98000 C ==== AA MP MP SENSIBLE (KETU/H) (FLOOR SOFT 455 COLING LOAD UG 24 5PM 78F 26C 66F 19C **ENTION CRETU/H)** **528 0.000 0.751 0.000 0.00	TWARE DEVELOPMENT DIN&MP MULTIPLIER M2 M3	T INC 1.0 -128.236 K 26.171BT	HEATING JAN 23 -13F -14F SENSII (KBTU/H) -29.546 -21.855 0.000 0.000 0.000 -14.882 0.000 0.000 -61.953 128.236 3TU/H J/H.SQFT	LOAD 3PM -25C -26C BLE (KW)	к₩	LDL RUN
PACE DIN&MP MULTIP, FLOOR VOLUME TIME DRY-BULB TE WET-BULB TE WET-BULB TE WALLS ROOFS GLASS CONDUCTION GLASS SOLAR DOOR INTERNAL SURFACES UNDERGROUND SURFACES OCCUPANTS TO SPACE LIGHT TO SPACE EQUIPMENT TO SPACE PROCESS TO SPACE INFILTRATION TOTAL TOTAL TOTAL TOTAL TOTAL LOAD	INC. EZ. 80227 AD COMPONENTS LIER 1.0 AREA 4900 98000 E==== (KBTU/H) (FLOOR SOFT 455 COULING LOAD LOG 19 COULING LOAD LOG 19 COULING LOAD LOG 19 COULING LOAD LOG 19 COULING LOG 19 C	TWARE DEVELOPMENT DIN&MP MULTIPLIER M2 M3 ENT (KW)	T INC 1.0 -128.236 K 26.171BT	DOE-2.1D BIG DELTA HEATING JAN 23 -13F -14F SENSI (KBTU/H) -29.546 -21.855 0.000 0	LOAD 3PM -25C -26C BLE (KW)	к₩	LDL RUN
PACE DIN&MP MULTIP, FLOOR VOLUME TIME DRY-BULB TE WET-BULB TE WET-BULB TE WALLS ROOFS GLASS CONDUCTION GLASS SOLAR DOOR INTERNAL SURFACES UNDERGROUND SURFACES OCCUPANTS TO SPACE LIGHT TO SPACE EQUIPMENT TO SPACE PROCESS TO SPACE INFILTRATION TOTAL TOTAL TOTAL TOTAL TOTAL LOAD	INC. 80227 AD COMPONENTS LIER 1.0 AREA 4900 98000 C MP MP MP SENSIBLE (KBTU/H) (15.459 4 12.806 3 0.000 0 0.000	DOE - ELITE SOF SOFT 455 CUFT 2775 COOLING LOAD UG 24 5PM 78F 26C 66F 19C KW) (KBTU/H) .528 0.000	TWARE DEVELOPMENT DIN&MP DIN&MP MULTIPLIER M2 M3 FENT (KW) 0.000 0	1.0 = -128.236 K 26.171BT	DOE-2.1D BIG DELTA HEATING	LOAD 3PM -25C -26C BLE (KW)	к₩	LDL RUN

EMC DENVER, REPORT- LS-C E	ENGINEERS CO BUILDING PE	INC. 80227 AK LOAD C	E2 7 COMPONENTS	ZDOE - : S	ELITE SOF	TWARE DEVE	LOPMENT	INC	DOE- BIG	2.1D DELTA	11/28/19 , A K	995	15:32:37	LDL RUN
** BUILDING *														
		R AREA ME	50228 636352	SOFT CUFT	4666 18021	SOMT CUMT								4
			C	COOLING	LOAD				HE	ATING	LOAD			
	TIME DRY-BULB WET-BULB	TEMP TEMP	J	JUL 12	5PM 31C 18C				DE	C 10 1	LIAM			
		(KBTU	SENSIBLE	KW)	LATI (KBTU/H)	ENT (KW)			(KBTU	SENSIE /H)	BLE (KW)			
WALLS ROOFS GLASS CON GLASS SOL DOOR INTERNAL	NDUCTION LAR SURFACES	136. 216. 65. 144. 0.	150 39 453 63 351 19 633 42 000 0	0.875 3.394 0.140 0.359 0.000	0.000 0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000 0.000			-200. -256. -114. 0.	787 246 412 099 000	-58.805 -75.048 -33.508 0.029 0.000			
UNDERGROU OCCUPANTS LIGHT EQUIPMENT PROCESS INFILTRAT	WET-BULB NDUCTION LAR SURFACES IND SURFACE TO SPACE TO AREA	5 -28. 0. 0. 0. 54.	731 -8 000 0 000 0 000 0 000 0 233 15	.414 .000 .000 .000 .000	0.000 0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000 0.000			-107. 0. 0. 0. 0.	282 000 000 000 000 006 077 -	-31.420 0.000 0.000 0.000 0.002 108.972			
TOTAL LOA	D D	588. 588	090 172	.237	0.000	0.000			-1050.	 699 -	307.723			
TOTAL BOX	D / AREA	*								_	307.723 65.945	K₩ ₩,	/SQMT	
TOTAL BOX	D / AREA	* * * *	NOTE 1)THE AE LOADS)TIMES IN CON	BOVE LOADS GIVEN IN WSIDERATIC	S EXCLUDE C	OUTSIDE	VENTIL	ATION AIR OCATION	* * *	307.723 65.945	KW W	/sqmt	
EMC	ENGINEERS	**************************************	NOTE 1 2) THE AE LOADS) TIMES IN CON	GOVE LOADS GIVEN IN NSIDERATIO	S EXCLUDE C STANDARD I N	OUTSIDE	VENTIL	ATION AIR	* * * * *				LDI. RIM 1
EMC 1	ENGINEERS	**************************************	NOTE 1 2) THE AE LOADS) TIMES IN CON	BOVE LOADS GIVEN IN VISIDERATION CONTROL CONTR	S EXCLUDE C STANDARD I N	OUTSIDE	VENTIL THE L	ATION AIR DCATION DCATION DOE-:	****** 2.1D DELTA,	 11/28/19 AK	 95	15:32:37	LDL RUN 1
EMC DENVER, PORT- LS-D BI	ENGINEERS CO UILDING MON	INC. 80227	NOTE 1 2) THE AE LOADS) TIMES IN CON	GIVEN IN USIDERATION ELITE SOFT	S EXCLUDE C STANDARD I NN **********************************	OUTSIDE	VENTIL THE L	ATION AIR DCATION DOE-: BIG I	* * * * * * * * * * * * * * * * * * *	11/28/19 AK	95	15:32:37	
EMC 1 DENVER, PORT- LS-D BI COOLII ENERG	ENGINEERS CO UILDING MONC NG TIME GY OF MAX	INC. 80227 TTHLY LOAI	NOTE 1 2 ******** EZ: DS SUMMAR: N G WET- BULB) THE AB LOADS) TIMES IN CON	GOVE LOADS GIVEN IN NSIDERATIC STATE SOFT MUM LING OAD	SEXCLUDE C STANDARD I N ***********************************	OUTSIDE TIME FOR OPMENT H OF MA	VENTIL THE L T	DOE-: BIG I I N G (- WET- BILB	* * * * * * * * * * * * * * * * * * *	AK 	95	15:32:37 E L ELEC- TRICAL DEDECY	E C MAXIMUM ELEC
EMC 1 DENVER, PORT- LS-D BI COOLII ENERG	ENGINEERS CO UILDING MONC NG TIME GY OF MAX	INC. 80227 TTHLY LOAI	NOTE 1 2 ******** EZ: DS SUMMAR: N G WET- BULB) THE AB LOADS) TIMES IN CON	GOVE LOADS GIVEN IN NSIDERATIC STATE SOFT MUM LING OAD	SEXCLUDE C STANDARD I N ***********************************	OUTSIDE TIME FOR OPMENT H OF MA	VENTIL THE L T	DOE-: BIG I I N G (- WET- BILB	* * * * * * * * * * * * * * * * * * *	AK 	95	15:32:37 E L ELEC- TRICAL DEDECY	E C MAXIMUM ELEC
EMC 1 DENVER, PORT- LS-D BI COOLII ENERC	ENGINEERS CO UILDING MONC NG TIME GY OF MAX	INC. 80227 TTHLY LOAI	NOTE 1 2 ******** EZ: DS SUMMAR: N G WET- BULB) THE AB LOADS) TIMES IN CON	GOVE LOADS GIVEN IN NSIDERATIC STATE SOFT MUM LING OAD	SEXCLUDE C STANDARD I N ***********************************	OUTSIDE TIME FOR OPMENT H OF MA	VENTIL THE L T	DOE-: BIG I I N G (- WET- BILB	* * * * * * * * * * * * * * * * * * *	AK 	95	15:32:37 E L ELEC- TRICAL DEDECY	E C MAXIMUM ELEC
EMC 1 DENVER, 1 PORT- LS-D BI COOLII ENER	ENGINEERS CO UILDING MON	INC. 80227 TTHLY LOAI	NOTE 1 2 ******** EZ: DS SUMMAR: N G WET- BULB) THE AB LOADS) TIMES IN CON	GOVE LOADS GIVEN IN NSIDERATIC STATE SOFT MUM LING OAD	SEXCLUDE C STANDARD I N ***********************************	OUTSIDE TIME FOR OPMENT H OF MA	VENTIL THE L T	DOE-: BIG I I N G (- WET- BILB	* * * * * * * * * * * * * * * * * * *	AK 	95	15:32:37 E L ELEC- TRICAL DEDECY	E C MAXIMUM ELEC

EMC DENVI LDS_RPT_1	ENGINEERS ER, CO = HOURI	INC. 80227 LY-REPORT	EZDOE -	ELITE SO	FTWARE DEVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, AK	15:32:37	LDL RUN 1
MM DDHH	BUILDING	BUILDING	GLOBAL	GLOBAL	GLOBAL			
	SENSIBLE HTG LOAD BTU/HR (1) SUMMARY (JAN) -1021075.	LATENT HTG LOAD BTU/HR (2)	DRY BULB TEMP F	ABS TEMP	FLAG			
MX SM AV	-411295. -501698784. -674326.	32160. 2056880. 2765.	-42.0 18.0 -3378.0 -4.5	474.6 474.6 353122.9 474.6	100.			
MONTHLY S MN MX SM AV	SUMMARY (FEB) -987984. -168261. -398053600. -592342. SUMMARY (MAR) -947695.	0. 32160. 1850120. 2753.	-44.0 40.0 1340.0 2.0	469.6 469.6 315544.8 469.6	0. 1. 10. 0.			
MX SM	-75091. -340064384.	17240. 1986290.	42.0 6894.0	469.2 349051.3	1. 48.			
MN MX SM	-668801. 0. -191743040.	0. 17240. 1360710.	-13.0 52.0 19827.0	471.6 471.6 339522.8 471.6	0. 1. 68. 0.			
MIX SM	0. -57703676.	7970. 298540.	70.0 3545 9.0	481.2 358021.8	1. 2.			
MN MX SM AV	-77559. SUMMARY (JUN) -137710. 01122624315592. SUMMARY (JUL) -93044. 024385023278.	0. 280. 1680. 2.	41.0 82.0 41425.0 57.5	490.8 490.8 353390.3 490.8	0. 0. 0. 0.			
MN MX SM AV	-93044. 0. -2438502. -3278.	0. 0. 0.	38.0 87.0 44355.0 59.6	499.1 499.1 371367.1 499.1	0. 0. 0. 0.			
EMC DENVE LDS_RPT_1	ENGINEERS ER, CO = HOURI	INC. 80227 Y-REPORT	EZDOE -	ELITE SO	FTWARE DEVELOPMENT INC	DOE-2.1D 11/28/1995 BIG DELTA, A K	15:32:37	LDL RUN 1
	BUILDING	BUILDING	GLOBAL					
MONTULV	SENSIBLE HTG LOAD BTU/HR (1)	LATENT HTG LOAD BTU/HR (2)	DRY BULB TEMP F	ABS TEMP	FLAG			
MN MX SM AV	-91874. 0. -3395090. -4563.	1290. 3530. 5.	37.0 82.0 41588.0 55.9	504.4 504.4 375292.8 504.4	0. 0. 0.			
MN MX SM AV MONTHLY S	BTU/HR (1) SUMMARY (AUG) -91874.0 -3395090. -4563. SUMMARY (SEP) -233395. -30308414. +2095. SUMMARY (OCT)	0. 7970. 288340. 400.	18.0 68.0 30923.0 42.9	504.9 504.9 363509.2 504.9	1. 15. 0.			
MX SM AV	-459405. -1790. -157455056. -211633. SUMMARY (NOV)	0. 17240. 1111680. 1494.	45.0 18356.0 24.7	500.6 372433.1 500.6	0.			
MN MX SM AV MONTHLY S	-679169. -210139. -319657920. -443969.	0. 17240. 1781850. 2475.	35.0 5216.0 7.2	492.5 492.5 354575.3 492.5	0. 1 39. 0.			
MIN MIX SM AV	-1050699. -392634. -470000704.	0. 32160. 1960350. 2635.	-47.0 20.0 -4934.0 -6.6	483.2 483.2 359465.4 483.2	28. 0.			
MN MX SM AV	MMARY -1050699. 0 -2483745280283533.	32160. 12699970. 1450.	-53.0 87.0 237071.0 27.1	469.2 504.9 4265296.5 486.9	0. 1. 348. 0.			
DENVI SEPORT- SV	SK, CO Z-A SYSTEM DES	INC. 80227 SIGN PARAMETER	EZDOE -	ELITE SO	H&V1&2	DOE-2.1D 11/28/1995 BIG DELTA, AK	15:32:37	SDL RUN 1
SYS	STEM AL NAME MULT (N ELEC E (KW)	TITUDE TIPLIER 1.000	TI ID N	KW) PEC DEL		G HEATING COOL Y SENSIBLE CAPACITY) (SHR) (KBTU/HR) (BTU/B 0 0.000 -1034.000 0	ING HEATIN EIR EI TU) (BTU/BTU	IG R J)
2	ZONE NAME	SUPPLY EXH	AUST FLOW (FAN :	IMUM OUTSIDE COOLIN FLOW AIR CAPACIT ATIO FLOW (KBTU/HR .000 0. 0.0	Y SENSIBLE RATE CAPAC) (SHR) (KBTU/HR) (KBTU/	'ITY RAT HR) (KBTU/H	CE () MULTIPLIE

EMC DENV REPORT- S	VER,	ENGINEER CO SYSTEM I	RS INC 8022 DESIGN PARA	EZ 7 METERS	DOE - ELITI	SOFTWARE BE	DEVELOPM	ENT INC		.1D 11/28	/1995 1	5:32:37 8	SDL RUN 1
BB_RAD SUPPI FA (CFM	YSTEM NAME LY AN	MU ELEC (KW)	ALTITUDE ULTIPLIER 1.000 DELTA-T (F) 0.0	RETURN FAN (CFM) 0.	ELEC (KW) 0.000	DELTA-T (F) 0.0	OUTSIDE AIR RATIO 0.000	COOLING CAPACITY (KBTU/HR) 0.000	SENSIBLE (SHR)	HEATING CAPACITY (KBTU/HR) 0.000	COOLING EIR (BTU/BTU) 0.00	HEATING EIR (BTU/BTU) 0.00	
	ZONE NAME				FAN		OUTSIDE AIR FLOW	COOLING	SENSIBLE (SHR)	XTRACTION	HEATING	ADDITION RATE (KBTU/HR)	MULTIPLIER
EMC DENV REPORT- S	VER, SV-A	ENGINEER CO SYSTEM I	RS INC 8022 DESIGN PARA	E. EZ METERS	ZDOE - ELIT	e softwari K	DEVELOPM	MENT INC	DOE-2	.1D 11/28 ELTA, A K	/1995 1	5:32:37	SDL RUN 1
			ALTITUDE ULTIPLIER 1.000 DELTA-T (F) 2.4			MINIMIM			SENSIBLE (SHR) 0.000	WITH BOTH ON	TIP A TEXAL	* DDTTTON	
KITCHEN	ZONE NAME		SUPPLY FLOW 2500.	EXHAUST FLOW 0.	FAN (KW) 0.000	FLOW RATIO 1.000	FLOW 2500.	(KBTU/HR)	SENSIBLE (SHR)	(KBTU/HR) 0.00	(KBTU/HR) 0.00	(KBTU/HR) -37.19	MULTIPLIER 1.0
REPORT-	SV-A	SYSTEM I	DESIGN PARA	E2 7 AMETERS	ZDOE - ELIT	E SOFTWAR G	E DEVELOP!	MENT INC	DOE-2 BIG I	2.1D 11/28 DELTA, AK	3/1995	15:32:37	SDL RUN 1
GYM_HV SUPP F. (CFM 1377	YSTEM NAME LY AN)	ELEC (KW) 8.127	ALTITUDE ULTIPLIER 1.000 DELTA-T (F) 2.4		ELEC (KW) 0.000				SENSIBLE (SHR)				
GYM ADJ_TO_G	ZONE NAME YM		SUPPLY FLOW 10331. 3444.	EXHAUST FLOW 0. 0.	FAN (KW) 0.000 0.000	FLOW RATIO 1.000 1.000	AIR FLOW 1550. 517.	COOLING CAPACITY (KBTU/HR) 0.00	SENSIBLE (SHR) 0.00	EXTRACTION RATE (KBTU/HR) 0.00 0.00	HEATING CAPACITY (KBTU/HR) 0.00 0.00	RATE (KBTU/HR) -412.70 -137.58	MULTIPLIER 1.0
EMC DEN REPORT-	VER,	ENGINEE CO SYSTEM	RS INC 8022 DESIGN PARA	C. EX	ZDOE - ELIT	E SOFTWAR	E DEVELOPI	MENT INC	DOE-2 BIG I	2.1D 11/28 DELTA, A K	3/1995	15:32:37	SDL RUN 1
S MPHVU SUPP F (CFM 450	YSTEM NAME LY AN ()	ELEC (KW) 2.655	ALTITUDE ULTIPLIER 1.000 DELTA-T (F) 2.4	RETURN FAN (CFM) 3825.	ELEC (KW) 0.000	DELTA-T (F) 0.0	OUTSIDE AIR RATIO 0.150	COOLING CAPACITY (KBTU/HR) 0.000	S SENSIBLE (SHR)	HEATING CAPACITY (KBTU/HR) -89.203	COOLING EIR (BTU/BTU) 0.00	HEATING EIR (BTU/BTU) 0.00	
DIN&MP	ZONE NAME		SUPPLY FLOW 4500.	EXHAUST FLOW 0.	FAN (KW) 0.000	MINIMUM FLOW RATIO 1.000	OUTSIDE AIR FLOW 675.	COOLING CAPACITY (KBTU/HR) 0.00	S SENSIBLE (SHR) 0.00	EXTRACTION RATE (KBTU/HR) 0.00	HEATING CAPACITY (KBTU/HR) 0.00	ADDITION RATE (KBTU/HR) -106.16	MULTIPLIER 1.0
EMC DEN REPORT-	VER,	ENGINEE CO PLANT M	RS IN 802: ONTHLY LOA	C. E. 27 DS SUMMARY	ZDOE - ELIT	E SOFTWAR	E DEVELOP	MENT INC	DOE-:	2.1D 11/2	8/1995	15:32:37	SDL RUN 1
MONTH	COOL:	ING RGY OF	- C O O L TIME DRY MAX BUL			 1 1 1	EATING ENERGY (MBTU)	H E A TIME I OF MAX I DY HR	T I N G	MAXII HEAT L(MUM ING DAD HR)	E L E ELEC- TRICAL ENERGY (KWH)	C MAXIMUM ELEC LOAD (KW)
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	000 000 000 000 000 000 000 000 000 00	II. 150	AMPI	0.000	9 - 97 - 64 - 42 - 22 - 24 - 24 - 24 - 24 - 24	01.605 36.288 73.526 65.717 41.675 41.675 46.064 87.689 28.937 59.873 67.016 67.0482	23 12 - 3 12 - 19 11 14 7 15 4 27 7 26 2 27 8 25 12 21 11 11 -	14.F -15.F 29.F -29.F 20.F -21.F 33.F 39.F 44.F 40.F 44.F 41.F 44.F 23.F 12.F 11.F 21.F -21.F	-2280.: -2179.: -2006.: -1643.: -834.: -635.: -255.: -986.: -784.: -1320.: -1652.: -2339.:	545 429 971 253 677 440 388 591 184 033	15063. 13606. 15069. 15066. 15066. 2438. 0. 2915. 14576. 15063. 14576. 15060.	21.638 21.638 21.638 21.638 21.638 21.638 21.638 21.638 21.638 21.638 21.638

EI Di	MC ENVER,	ENGINEERS CO	90227								15:32:37	SDL RUN 1
REPORT	- \$S-A	SYSTEM MO	NTHLY LOADS	SUMMARY FOR								
MONTH	COOLI ENER (MBT	ING TI RGY OF M	COOLIN ME DRY- I AX BULB I HR TEMP	G M MET - CO BULB FEMP (KB	AXIMUM DOLING LOAD TU/HR)	HEATIN ENERG (MBTU	G TIME OF MAX OF MAX	EATIN DRY- BULB TEMP	G WET- BULB TEMP (MAXIMUM HEATING LOAD KBTU/HR)	E L ELEC- TRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)
JAN FEB MAR APR JUN JUL AUG SEP OCT NOV DEC	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	000 000 000 000 000 000 000 000 000 00			0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	-340.43 -279.99 -257.72 -180.31 -92.87 -4.77 0.00 -7.36 -84.78 -172.44 -250.17	1 22 12 8 5 15 9 5 10 1 19 7 1 14 7 9 15 4 0 7 28 7 8 29 9 8 23 12 1 10 11	-19.F - -14.F - -4.F 33.F 41.F 38.F -2.F -2.F	19.F 14.F 15.F 29.F 40.F 36.F 18.F -3.F 22.F	-781.576 -750.689 -695.093 -544.811 -314.180 -334.907 -174.432 -294.218 -444.164 -583.308	6979 6304 6979 6754 6979 1135 0 1351 6754 6979 6754 6979	9.381 9.381 9.381 9.381 9.381 9.381 9.381 9.381 9.381
TOTAL MAX	0.0	000			0.000	-1994.28	Ü			-803.178	V 3,30.	9.381
EI DI REPORT	MC ENVER, - SS-C	ENGINEERS CO SYSTEM MO	INC. 80227 NTHLY LOAD 1	EZDOE HOURS FOR	- ELITE S	OFTWARE DEV H&V1&2	ELOPMENT I	NC	DOE-2.1D BIG DELTA	11/28/1995 , AK	15:32:37	SDL RUN 1
MONTH	HOURS COOLING LOAD	HOURS HEATING LOAD	HOURS COINCIDEN COOL-HEAT LOAD	HOURS FLOATING	HOURS HEATING AVAIL.	HOURS COOLING AVAIL.	HOURS FANS ON	HOURS FANS CYCLE ON	HOURS NIGHT VENTING	HOURS I FLOATING I WHEN G FANS ON	LOAD AT LOCOLING CO PEAK (KBTU/HR)	LECTRIC DAD AT DOLING PEAK (KW)
JAN FEB MAR APR JUN JUL AUG SEP OCT NOV DEC	000000000000000000000000000000000000000	744 672 744 720 733 102 123 701 744 744	000000000000000000000000000000000000000	0 0 0 0 11 618 744 621 19 0 0	744 672 744 720 744 720 744 720 744	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	744 672 744 720 744 121 0 144 720 744 720 744	0 0 0 0 1 0 0 0	000000000000000000000000000000000000000	0 0 0 11 19 0 21 19 0	-325.011 -262.092 -216.412 -170.345 -170.345 -113.415 0.000 0.000 -1.187 -124.760 -255.198 -267.439 -302.796	9.381 9.381 9.381 9.381 9.381 9.381 9.381 9.381 9.381 9.381
REPORT	MC ENVER, - SS-K	ENGINEERS CO SPACE TEM	INC. 80227 PERATURE SU	EZDOE MMARY	- ELITE S	OFTWARE DEV	ELOPMENT I	NC	DOE-2.1D BIG DELTA	, AK	15:32:37	
	A V	ERAGE	SPAC	E TEM	P	AVERAGE TEM	PERATURE D)IFFERENCE BETWEEN	SUMMED BETWEEN	TEMP DIFFER	ENCE EEN HUM	IDITY RATIO
MONTH	ALL HOURS (F)	COOLING HOURS (F)	HEATING HOURS (F)	FAN ON FA HOURS HO (F) (N OFF URS F)	OUTDOOR& ROOM AIR ALL HOURS (F)	ROOM AIR FAN ON HOURS (F)	ROOM AIR FAN OFF HOURS (F)	ROOM AI HEATING HOURS (F)	R ROOM R ALL HOUR:	ENCE EEN HUM OOR& AIR S (FRAC	BETWEEN COUTDOOR AND ROOM AIR .)
JAN FEB MAR APR JUN JUL AUG SEP OCT NOV DEC	70.16 70.23 70.36 70.54 70.77 70.31 70.38 70.43 70.43 70.80 70.58 70.37 70.21		70.16 70.23 70.36 70.54 70.77 71.35 71.08 70.78 70.58 70.58	70.16 70.23 70.36 70.54 70.57 71.38 0.00 71.17 70.80 70.58 70.58	0.00 0.00 0.00	-74.70 -68.24 -61.10 -43.00 -23.11 -12.77 -10.76 -14.53 -27.85 -45.90 -63.13 -76.84	-74.70 -68.24 -61.10 -43.00 -23.11 -9.42 0.00 -15.94 -27.85 -45.90 -63.13	0.00 0.00 0.00	2315.83 1910.74 1894.05	2315 1894 1290 716 402 466 835 1423	.83 .74 .05 .14 .54 .85 .51	-0.00413 -0.00397 -0.00347 -0.00282 -0.00094 0.00210 0.00113 -0.00280 -0.00260 -0.00366 -0.00393
		0.00	70.47	70.48	70.25	-43.37	-52.12	-12.65	14796.08	15892	. 44	-0.00186
E D REPORT	MC ENVER,	ENGINEERS CO RELATIVE	INC. 80227 HUMIDITY SC	EZDOE ATTER PLOT F	- ELITE S	OFTWARE DEV	VELOPMENT I	inc	DOE-2.1D BIG DELTA	11/28/1995 , AK	15:32:37	SDL RUN 1
	81-1 71-4 61-7 51-4 41-9 31-3	100 80 70 60	0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 18 18 18 265 265 265	4 5 6 0 0 0 0 0 0 0 0 0 0 0 0 17 19 23 265 265 260	7 8 0 0 0 0 0 0 0 0 1 1 25 21 258 262 4	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	12 1PM 2 0 0 0 0 0 0 0 0 0 0 1 2 23 25 2 260 257 26	2 3 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 3 2 4 20 24 20 51 258 260	5 6 0 0 0 0 0 0 0 0 0 1 0 0 26 23 26 23	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 2 2 26 28 24 256 254 258	0 0 0 0 0 0 0 0 0 0 0 0 1 2 2	TOTAL 0 0 0 0 0 44 534 6238

D	MC ENVER,	ENGINEERS CO	INC. 80227			SOFTWARE DEVI					15:32:37	SDL RUN 1
REPORT	- s s-0	TEMPERATUR	E SCATTER	PLOT H&V1		FOR INTERIC			BIG DELTA,	AK		
		HOUR 1	AM 2 3	TOTAL 4 5 6	HOURS AT '	TEMPERATURE I	LEVEL AND TI	IME OF DAY	Y 5 6 7	8 9	10 11 12	TOTAL
	ABOVE 81-85		0 0 0	0 0	0 0	0 0 0	0 0 0			0 0 0 0 0 0 0 0 0	0 0 0	0 0
	76-80 71-75 66-70	28	0 0 0	0 0	251 249 : 33 35	0 0 0 243 241 242 2 41 43 42	247 249 250	250 280 3	280 283 28	3 283 284	284 284 284	6471 345
	61-65 BELOW	60	0 0 0	0 0	0 0	41 43 42 0 0 0 0 0 0	0 0 0	0 0	0 0 0 0 === === ==	1 1 0 0 0 0 0 0 0	0 0 0	0 0 ====
										77727232		
E PORT	MC ENVER,	ENGINEERS CO SYSTEM MON	INC. 80227 THLY LOADS	EZDO SUMMARY F	E - ELITE : OR	SOFTWARE DEVI	ELOPMENT INC	c 1	DOE-2.1D BIG DELTA,	11/28/1995 AK	15:32:37	SDL RUN 1
			OOLIN								E I	E C
	COOL	ING TIM			MAXIMUM COOLING	HEATING ENERG (MBTU	TIME	DRY- W	ET-	MAXIMUM HEATING	בו בר_	MAXIMUM ELEC LOAD (KW)
MONTH	ENER (MB)	RGY OF MA TU) DY 1	IR TEMP	TEMP (OF MAX DY HR	TEMP T	EMP (K	CBTU/HR)	(KWH)	
JAN FEB MAR	0.000 0.000 0.000	000			0.000 0.000 0.000	-165.03 -132.40 -114.79	1 22 12 7 3 9 4 2 8	-19.F -1 -39.F -4 -40.F -4 32.F 4 43.F 4 37.F 2 -7.F -2 -21.F -2	9.F - 9.F -	303.256 305.916 283.448 206.496 109.470 238.625 202.077 190.350 124.336 186.175 237.976	0. 0. 0.	0,000 0.000 0.000
APR MAY	0.000	000 000			0.000 0.000 0.000	-73.37 -31.94	19 8 2 3 6	0.F -:	2.F -	206.496	0. 0. 0.	0.000 0.000
JUN JUL A UG	0.000	000 000			0.000	-53.94 -47.83 -50.16	1 27 6 3 21 7	43.F 4 37.F 3	1.F 7.F	-202.077 -190.350	0. 0.	0.000 0.000
SEP OCT NOV	0.000 0.000 0.000	000			0.000 0.000 0.000	-40.44 -85.85 -124.41 -160.98	2 27 8 4 29 8 1 2 8	26.F 2 -7.F -	3.F - 8.F - 1.F -	-124.336 -186.175 -237.976	0. 0. 0.	0.000
DEC	0.000	000			0.000	-160.98 -1081.18		-22.F -2	2.F -	314.897	0. 0.	
TOTAL MAX	0.0	000			0.000	-1001.10	±			-314.897	0.	0.000
<u>E</u>	MC	ENGINEERS	INC.	EZDO	E - ELITE	SOFTWARE DEV	ELOPMENT IN	c :	DOE-2.1D	11/28/1995	15:32:37	SDL RUN 1
	THE COLOR	CO										
REPORT	- 88-0	SYSTEM MON	THLY LOAD	HOURS FOR		BB_RAD			BIG DELTA,	AK		
REPORT	· ·	SYSTEM MON	THLY LOAD	N U M	BER	OF HOU	R S			nothe	COINCIDENT	LECTRIC
REPORT	· ·	SYSTEM MON HOURS HEATING LOAD	HOURS COINCIDEN COOL-HEAT	N U M T HOURS FLOATIN	BER HOURS HEATIN G AVAIL	OF HOURS G COOLING. AVAIL.	RS HOURS FANS ON (HOURS FLOATING WHEN	HEATING E LOAD AT I COOLING C	LECTRIC LOAD AT COOLING PEAK
MONTH	HOURS COOLING LOAD	SYSTEM MON HOURS HEATING LOAD	HOURS COINCIDEN COOL-HEAT	N U M T HOURS FLOATIN	BER HOURS HEATIN G AVAIL	OF HOURS G COOLING. AVAIL.	RS HOURS FANS ON (HOURS FANS CYCLE ON	HOURS NIGHT VENTING	HOURS FLOATING WHEN FANS ON	HEATING E LOAD AT I COOLING C PEAK (KBTU/HR)	ELECTRIC LOAD AT COOLING PEAK (KW)
MONTH JAN FEB MAR	HOURS COOLING LOAD	SYSTEM MON HOURS HEATING LOAD	HOURS COINCIDEN COOL-HEAT	N U M T HOURS FLOATIN	BER HOURS HEATIN G AVAIL	OF HOURS G COOLING. AVAIL.	RS HOURS FANS ON (HOURS FANS CYCLE ON	HOURS NIGHT VENTING	HOURS FLOATING WHEN FANS ON	HEATING E LOAD AT I COOLING C PEAK (KBTU/HR)	CLECTRIC LOAD AT COOLING PEAK (KW) 0.000 0.000 0.000
MONTH JAN FEB MAR APR MAY JUN	HOURS COOLING LOAD	SYSTEM MON HOURS HEATING LOAD	HOURS COINCIDEN COOL-HEAT	N U M T HOURS FLOATIN	BER HOURS HEATIN G AVAIL	OF HOURS G COOLING. AVAIL.	RS HOURS FANS ON (HOURS FANS CYCLE ON	HOURS NIGHT VENTING	HOURS FLOATING WHEN FANS ON	HEATING E LOAD AT I COOLING C PEAK (KBTU/HR)	DLECTRIC JOAD AT COOLING PEAK (KW) 0.000 0.000 0.000 0.000 0.000
MONTH JAN FEB MAR APR MAY JUL AUG SEP	HOURS COOLING LOAD	SYSTEM MON HOURS HEATING LOAD	HOURS COINCIDEN COOL-HEAT	N U M T HOURS FLOATIN	BER HOURS HEATIN G AVAIL	OF HOURS G COOLING. AVAIL.	RS HOURS FANS ON (HOURS FANS CYCLE ON	HOURS NIGHT VENTING	HOURS FLOATING WHEN FANS ON	HEATING E LOAD AT I COOLING C PEAK (KBTU/HR)	CLECTRIC COLORD AT COOLING PEAK (KW) 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
MONTH JAN FEB MAR APR APR JUN JUL SEP OCT	HOURS COOLING LOAD	SYSTEM MON HOURS HEATING LOAD	HOURS COINCIDEN COOL-HEAT	N U M T HOURS FLOATIN	BER HOURS HEATIN G AVAIL	OF HOURS G COOLING. AVAIL.	RS HOURS FANS ON (HOURS FANS CYCLE ON	HOURS NIGHT VENTING	HOURS FLOATING WHEN FANS ON	HEATING E LOAD AT I COOLING C PEAK (KBTU/HR)	CLECTRIC COOLING PEAK (KW) 0.000
MONTH JAN FEB MAPR MAPR MAPR JUN JUL AUG SEP OCT NOV DEC	HOURS COOLING LOAD	HOURS HEATING LOAD 744 672 744 714 610 553 553 585 649 744 720 744	HOURS COINCIDEN COOL-HEAT	HOURS FOR HOURS FLOATIN O 134 167 191 159 71 0 0	B E R HOURS HEATIN G AVAIL 74 67 72 74 72 74 72 74 72 74 72 74	BB_RAD O F H O U HOURS G COOLING AVAIL. 4 744 2 672 4 744 0 720 4 744 0 720 4 744 0 720 4 744 0 720 4 744	RS HOURS FANS ON (HOURS FANS CYCLE ON	HOURS NIGHT VENTING	HOURS FLOATING WHEN	HEATING E LOAD AT I COOLING C PEAK (KBTU/HR)	CLECTRIC COLORD AT COOLING PEAK (KW) 0.000
MONTH JAN FEB MAPR MAPR MAPR JUN JUL AUG SEP OCT NOV DEC	HOURS COOLING LOAD	HOURS HEATING LOAD 744 672 744 714 610 553 553 585 649 744 720 744	THLY LOAD	HOURS FOR HOURS FLOATIN O 134 167 191 159 71 0 0	B E R HOURS HEATIN G AVAIL 74 67 72 74 72 74 72 74 72 74 72 74	BB_RAD O F H O U HOURS G COOLING AVAIL. 4 744 2 672 4 744 0 720 4 744 0 720 4 744 0 720 4 744 0 720 4 744	RS HOURS FANS ON (HOURS FANS CYCLE ON	HOURS NIGHT VENTING 0 0 0 0 0 0 0	HOURS FLOATING WHEN ON 0 0 0 0 6 1344 167 191 159 77	HEATING E LOAD AT I COOLING C PEAK (KBTU/HR)	CLECTRIC COLORD AT COOLING PEAK (KW) 0.000
MONTH JAN FEB MAR APR APR JUN JUN AUG SEP OCT NOV DEC ANNUAL	HOURS COOLING LOAD	HOURS HEATING LOAD 744 672 744 714 610 553 555 649 744 720 744	THLY LOAD	HOURS FOR N U M T HOURS FLOATIN 0 0 6 134 167 191 159 71 0 0 0 728	B E R HOURS HEATIN G AVAIL 74 67 72 74 72 74 72 74 74 72 74 74 72 74 74 75 876	BB_RAD O F H O U HOURS G COOLING AVAIL 4 744 2 672 4 744 0 720 4 744 0 720 4 744 0 720 4 744 0 720 6 8760	R S	HOURS FANS CYCLE ON	HOURS NIGHT VENTING 0 0 0 0 0 0 0 0 0	HOURS FLOATING WHEN 0 0 0 0 6 134 167 191 159 771 0 0	HEATING LOAD AT COOLING PEAK (KBTU/HR) -189 .332 -149 .217 -110 .976 -77 .883 -53 .765 -65 .002 0 .000 0 .76 .723 -160 .645 -178 .452	CLECTRIC COLONG COLONG PEAK (KW) 0.000
MONTH JAN FEB MAR APR APR JUN JUN AUG SEP OCT NOV DEC ANNUAL	HOURS COOLING LOAD	HOURS HEATING LOAD 744 672 744 714 610 553 555 649 744 720 744	THLY LOAD	HOURS FOR N U M T HOURS FLOATIN 0 0 6 134 167 191 159 71 0 0 728	B E R HOURS HEATIN G AVAIL 74 67 74 72 74 74 72 74 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 74 72 74 74 72 74 74 72 74 74 72 74 74 72 74 74 74 74 74 74 74 74 74 74 74 74 74	BB_RAD O F H O U HOURS G COOLING AVAIL. 4 744 2 672 4 744 0 720 4 744 0 720 4 744 0 720 4 744 0 720 4 744	R S	HOURS FANS CYCLE ON	HOURS NIGHT VENTING 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS FLOATING WHEN 0 0 0 1 6 134 167 191 159 728	HEATING LOAD AT COOLING PEAK (KBTU/HR) -189 .332 -149 .217 -110 .976 -77 .883 -53 .765 -65 .002 0 .000 0 .76 .723 -160 .645 -178 .452	CLECTRIC COLONG COLONG PEAK (KW) 0.000
MONTH JAN FEB MAR APR APR JUN JUN AUG SEP OCT NOV DEC ANNUAL	HOURS COOLING LOAD 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS HEATING LOAD 744 672 744 714 610 553 585 649 744 720 744 8032 ENGINEERS CO SPACE TEM	THLY LOAD HOURS COINCIDEN COOL-HEAT LOAD 0 0 0 0 0 0 0 0 0 1 0 0 1 INC. 80227 PERATURE SL	HOURS FOR N U M T HOURS FLOATIN 0 0 6 134 167 191 159 71 0 0 728	B E R HOURS HEATIN G AVAIL 74 67 72 74 72 74 72 74 74 78 78 76 876	BB_RAD O F H O U HOURS G COOLING AVAIL. 4 744 24 744 04 744 04 744 07 720 44 744 07 720 44 744 07 720 48 760 SOFTWARE DEV BB_RAD	R S	HOURS FANS CYCLE ON 0 0 0 0 0 0 0 0 0 0	HOURS NIGHT VENTING 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS FLOATING WHEN ON 0 0 0 6 1344 167 1991 771 0 0 0 728	HEATING LOAD AT ICOOLING PEAK (KBTU/HR) -189, 332 -149, 217 -110, 976 -77, 883 -53, 765 -65, 002 0.000 0.000 -76, 723 -160, 645 -178, 452	CLECTRIC COLORD AT COOLING PEAK (KW) 0.000 0.00
MONTH JAN FEB MAR APR APR JUN JUN AUG SEP OCT NOV DEC ANNUAL	HOURS COOLING LOAD 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS HEATING LOAD 744 672 744 714 610 553 585 649 744 720 744 8032 ENGINEERS CO SPACE TEMI	THLY LOAD HOURS COINCIDEN COOL-HEAT LOAD 0 0 0 0 0 0 0 0 0 0 INC. 80227 PERATURE SL	HOURS FOR HOURS FLOATIN HOURS FLOATIN 167 199 159 71 0 0 728 EZDO	B E R HOURS HEATIN G AVAIL 74 67 72 74 72 74 74 74 74 74 75 74 76 77 76 77 76 77 76 77 76 77 77 78 79 79 79 79 79 79 79 79 79 79 79 79 79	BB_RAD O F H O U HOURS G COOLING AVAIL 4 744 2 672 4 744 0 720 4 744 0 720 4 744 0 720 4 744 0 720 8760 SOFTWARE DEV BB_RAD AVERAGE TEM BETWEEN OUTDOOR& ROOM AIR	R S	HOURS FANS CYCLE ON 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS NIGHT VENTING 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS FLOATING WHEN ON 0 0 0 6 1344 167 1991 771 0 0 0 728	HEATING LOAD AT ICOOLING PEAK (KBTU/HR) -189, 332 -149, 217 -110, 976 -77, 883 -53, 765 -65, 002 0.000 0.000 -76, 723 -160, 645 -178, 452	CLECTRIC COLORD AT COOLING PEAK (KW) 0.000 0.00
MONTH JAN FEB MAR APR JUN JUN JUN JUN JUN JUN JUN JUN JUN TE REPORT	HOURS COOLING LOAD 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS HEATING LOAD 744 672 744 714 610 553 585 649 744 720 744 8032 ENGINEERS CO SPACE TEMI	HOURS O INC. 80227 PERATURE SU HEATING HOURS (F)	HOURS FOR N U M T HOURS FLOATIN 0 0 6 134 167 191 159 71 0 0 0 728 EZDO MMARY E T E FAN ON HOURS (F)	B E R HOURS HEATIN 74 67 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 75 876	BB_RAD O F H O U HOURS G COOLING AVAIL 4 744 2 672 4 744 0 720 4 744 0 720 4 744 0 720 4 744 0 720 6 720 6 720 6 720 720 744 744 744 744 744 744 744 744 744 74	R S	HOURS FANS CYCLE ON 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS NIGHT VENTING 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS FLOATING WHEN 0 0 0 1 6 134 167 191 159 728 728 11/28/1995 AK FEMP DIFFER BETW CR ROOM ALL HOUR	HEATING I LOAD AT COOLING PEAK (KBTU/HR) -189.332 -149.217 -110.976 -77.883 -53.765 -65.002 0.000 0.000 -76.723 -160.645 -178.452 -178.452 -15:32:37	CLECTRIC COAD AT COOLING PEAK (KW) 0.000
MONTH JAN FEB MAR APR APR JUN JUN JUN AUG SEP OCT NOV DEC ANNUAI REPORT MONTH	HOURS COOLING LOAD 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 ALL HOURS (F) 69.66	HOURS HEATING LOAD 744 672 744 714 610 553 585 649 740 720 744 720 744 8032 ENGINEERS COSPACE TEMI E R A G E COOLING HOURS (F)	HOURS O INC. 80227 PERATURE SU HEATING HOURS (F)	HOURS FOR N U M T HOURS FLOATIN 0 0 6 134 167 191 159 71 0 0 0 728 EZDO MMARY E T E FAN ON HOURS (F)	B E R HOURS HEATIN 74 67 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 75 876	BB_RAD O F H O U HOURS G COOLING AVAIL 4 744 2 672 4 744 0 720 4 744 0 720 4 744 0 720 4 744 0 720 6 720 6 720 6 720 720 744 744 744 744 744 744 744 744 744 74	R S	HOURS FANS CYCLE ON 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS NIGHT VENTING 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS FLOATING WHEN 0 0 0 1 6 134 167 191 159 728 728 11/28/1995 AK FEMP DIFFER BETW CR ROOM ALL HOUR	HEATING I LOAD AT COOLING PEAK (KBTU/HR) -189.332 -149.217 -110.976 -77.883 -53.765 -65.002 0.000 0.000 -76.723 -160.645 -178.452 -178.452 -15:32:37	CLECTRIC COAD AT COOLING PEAK (KW) 0.000
MONTH JAN FEB MAR APR JUN JUN JUN AUG OCT NOV DEC ANNUAI REPORT	HOURS COOLING LOAD 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS HEATING LOAD 744 672 744 714 610 553 585 649 740 720 744 720 744 8032 ENGINEERS COSPACE TEMI E R A G E COOLING HOURS (F)	HOURS O INC. 80227 PERATURE SU HEATING HOURS (F)	HOURS FOR N U M T HOURS FLOATIN 0 0 6 134 167 191 159 71 0 0 0 728 EZDO MMARY E T E FAN ON HOURS (F)	B E R HOURS HEATIN 74 67 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 75 876	BB_RAD O F H O U HOURS G COOLING AVAIL 4 744 2 672 4 744 0 720 4 744 0 720 4 744 0 720 4 744 0 720 6 720 6 720 6 720 720 744 744 744 744 744 744 744 744 744 74	R S	HOURS FANS CYCLE ON 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS NIGHT VENTING 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS FLOATING WHEN 0 0 0 1 6 134 167 191 159 728 728 11/28/1995 AK FEMP DIFFER BETW CR ROOM ALL HOUR	HEATING I LOAD AT COOLING PEAK (KBTU/HR) -189.332 -149.217 -110.976 -77.883 -53.765 -65.002 0.000 0.000 -76.723 -160.645 -178.452 -178.452 -15:32:37	CLECTRIC COAD AT COOLING PEAK (KW) 0.000
MONTH JAN FEB MAR APR JUN JUN AUG COT NOV DEC ANNUAL REPORT MONTH JAN FEB MAR APR MAPR MAPR MAPR MAPR MAPR MAY JUN MONTH	HOURS COOLING LOAD 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS HEATING LOAD 744 672 744 714 610 553 585 649 740 720 744 720 744 8032 ENGINEERS COSPACE TEMI E R A G E COOLING HOURS (F)	HOURS O INC. 80227 PERATURE SU HEATING HOURS (F)	HOURS FOR N U M T HOURS FLOATIN 0 0 6 134 167 191 159 71 0 0 0 728 EZDO MMARY E T E FAN ON HOURS (F)	B E R HOURS HEATIN 74 67 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 78 876	BB_RAD O F H O U HOURS G COOLING AVAIL 4 744 2 672 4 744 0 720 4 744 0 720 4 744 0 720 4 744 0 720 6 720 6 720 6 720 720 744 744 744 744 744 744 744 744 744 74	R S	HOURS FANS CYCLE ON 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS NIGHT VENTING 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS FLOATING WHEN 0 0 0 1 6 134 167 191 159 728 728 11/28/1995 AK FEMP DIFFER BETW CR ROOM ALL HOUR	HEATING I LOAD AT COOLING PEAK (KBTU/HR) -189.332 -149.217 -110.976 -77.883 -53.765 -65.002 0.000 0.000 -76.723 -160.645 -178.452 -178.452 -15:32:37	CLECTRIC COAD AT COOLING PEAK (KW) 0.000
MONTH JAN FEB MAR APR JUL AUG OCT NOV DEC ANNUAL REPORT REPORT REPORT MAR APR MAR APR JUL AUG AUG ANNUAL MONTH JAN JUL AUG ANNUAL MONTH JAN JUL AUG	HOURS COOLING LOAD 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS HEATING LOAD 744 672 744 714 610 553 585 649 740 720 744 720 8032 ENGINEERS COSPACE TEMI E R A G E COOLING HOURS (F)	HOURS O INC. 80227 PERATURE SU HEATING HOURS (F)	HOURS FOR N U M T HOURS FLOATIN 0 0 6 134 167 191 159 71 0 0 0 728 EZDO MMARY E T E FAN ON HOURS (F)	B E R HOURS HEATIN 74 67 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 78 876	BB_RAD O F H O U HOURS G COOLING AVAIL 4 744 2 672 4 744 0 720 4 744 0 720 4 744 0 720 4 744 0 720 6 720 6 720 6 720 720 744 744 744 744 744 744 744 744 744 74	R S	HOURS FANS CYCLE ON 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS NIGHT VENTING 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS FLOATING WHEN 0 0 0 1 6 134 167 191 159 728 728 11/28/1995 AK FEMP DIFFER BETW CR ROOM ALL HOUR	HEATING I LOAD AT COOLING PEAK (KBTU/HR) -189.332 -149.217 -110.976 -77.883 -53.765 -65.002 0.000 0.000 -76.723 -160.645 -178.452 -178.452 -15:32:37	CLECTRIC COAD AT COOLING PEAK (KW) 0.000
MONTH JAN HAR APRY JUN JAN FEB MAR APRY MONTH MONTH JAN FEB MAR APRY JUN	HOURS COOLING LOAD 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS HEATING LOAD 744 672 744 714 610 553 585 649 740 720 744 720 8032 ENGINEERS COSPACE TEMI E R A G E COOLING HOURS (F)	HOURS O INC. 80227 PERATURE SU HEATING HOURS (F)	HOURS FOR N U M T HOURS FLOATIN 0 0 6 134 167 191 159 71 0 0 0 728 EZDO MMARY E T E FAN ON HOURS (F)	B E R HOURS HEATIN 74 67 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 72 74 78 876	BB_RAD O F H O U HOURS G COOLING AVAIL 4 744 2 672 4 744 0 720 4 744 0 720 4 744 0 720 4 744 0 720 8760 SOFTWARE DEV BB_RAD AVERAGE TEM BETWEEN OUTDOOR& ROOM AIR	R S	HOURS FANS CYCLE ON 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS NIGHT VENTING 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS FLOATING WHEN 0 0 0 1 6 134 167 191 159 728 728 11/28/1995 AK FEMP DIFFER BETW CR ROOM ALL HOUR	HEATING I LOAD AT COOLING PEAK (KBTU/HR) -189.332 -149.217 -110.976 -77.883 -53.765 -65.002 0.000 0.000 -76.723 -160.645 -178.452 -178.452 -15:32:37	CLECTRIC COAD AT COOLING PEAK (KW) 0.000

DENVER, REPORT- SS-N	ENGINEER CO RELATIVE	80227	EZDO: 7 SCATTER PLOT		SOFTWARE DE BB_RA			DOE-2.1D BIG DELTA		15:32:37	SDL RUN
71 61 51 41 31	HOUR 1-100 1-80 1-70 1-60 1-50 1-40 30	1AM 2 3	4 5 6 0	7 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		12 1PM 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 4 0 0 0 0 0 0	5 6	0 0 0	10 11 12 0 0 0 0 0 0 0 0	TOTAL 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
EMC DENVER, REPORT- SS-O	ENGINEEF CO TEMPERAT	RS INC. 80227 URE SCATTER	EZDOI					DOE-2.1D BIG DELTA		5 15:32:37	SDL RUN
81-8 76-8 71-7 66-7 61-6	7E 85	0 0 0	4 5 6 0 0 0 0 0 0 0 0 231 225 227 134 140 138	7 8 0 0 0 0 0 0 0 0 0 7 226 222 3 139 143 0 0 0	0 0 0 0	12 1PM 2 0 0 0 0 0 0 246 251 255 119 114 110 0 0 0	3 4 0 0 0 0 0 0 0 0 5 257 252 0 108 113 0 0 0	5 6 0 0 0 0 0 0 265 261 2 100 104 1 0 0	0 0 0 0 0 0 0 0 0 58 258 260 07 107 105 0 0 0	10 11 12 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5867 2893 0
EMC DENVER, REPORT- SS-A	ENGINEER CO SYSTEM M	S INC. 80227 ONTHLY LOAD	EZDOE S SUMMARY FO	: - ELITE	SOFTWARE DEV	VELOPMENT IN	NC	DOE-2.1D BIG DELTA	11/28/1995 , AK	15:32:37	SDL RUN 1
COO: EN	LING T	COOLI IME DRY- MAX BULB HR TEMP		MAXIMUM COOLING LOAD BTU/HR)	HEATIN ENERG (MBTC	HE G TIME GY OF MAX J) DY HR	DRY- W BULB E TEMP I	ET- BULB	MAXIMUM HEATING LOAD KBTU/HR)	E L ELEC- TRICAL ENERGY (KWH)	E C MAXIMUM ELEC LOAD (KW)
FEB 0.00 MAR 0.00 APR 0.00 APR 0.00 JUN 0.00 JUL 0.00 AUG 0.00	0000 0000 0000 0000 0000 0000			0.000 0.000 0.000 0.000 0.000 0.000	-10.56 -8.55 -8.17 -5.40 -2.04 -0.01	3 11 24 3 11 21 18 11 25 2 11	-34.F -3 -32.F -3 -21.F -2 0.F - 35.F 3	4.F 2.F 2.F 2.F	-380.768 -368.192 -327.682 -236.454 -104.786 -7.848	62. 568. 59. 65. 9.	1.475 1.475 1.475 1.475 1.475
SEP 0.00 OCT 0.00 NOV 0.00	0000 0000			0.000 0.000 0.000 0.000	0.00 -0.09 -2.64 -5.61 -7.46 -10.45	00 25	58.F 4 38.F 3 7.F -6.F -	8.F 0.F 5.F 7.F	0.000 -29.563 -104.891 -202.348 -256.952 -410.249	0. 12. 59. 629. 59.	0.000 1.475 1.475 1.475 1.475
SEP 0.00 OCT 0.00 NOV 0.00 DEC 0.00 TOTAL 0	0000 0000 0000 0000 			0.000	-0.09 -2.64 -5.61 -7.46 -10.45 	00 15 28 11 3 21 11 5 25 11 1 2 2 11 1 8 11 1		•	410.249	62. 66. 689. 65. 9. 02. 159. 629. 59.	1.475
SEP 0.00 OCT 0.00 NOV 0.00 DEC 0.00 TOTAL 0 MAX	0000 0000 0000 0000 .000	S INC. 80227 ONTHLY LOAD	EZDOE HOURS FOR	0.000	-0.09 -2.64 -5.61 -7.46 -10.45 	28 11 3 21 11 5 25 11 2 2 11 1 8 11 1 ELOPMENT IN	 ic	•	11/28/1995	0. 12. 59. 62. 59. 59. 569.	1.475
SEP 0.00 OCT 0.00 NOV 0.00 DEC 0.00 TOTAL 0	0000 0000 0000 0000 .000 ENGINEER: CO SYSTEM MC	HOURS	HOURS FOR N U M	0.000 0.000 0.000 0.000 0.000 	-0.05 -2.64 -5.61 -7.46 -10.45 -61.02 SOFTWARE DEV KIT_MA O F H O U HOURS G COOLING	28 11 3 21 11 5 25 11 2 2 11 1 8 11 1 8 11 1 8 11 1 8 11 1 8 11 1 1 8 11 1 1 8 11	 ic	DOE-2.1D BIG DELTA, HOURS NIGHT	AK HOURS FLOATING WHEN FANS ON	15:32:37 COINCIDENT HEATING EI LOAD AT LO	1.475 SDL RUN 1

E D REPORT	MC ENVER,	ENGINE C SPACE	ERS O TEMPE	RATU	INC. 0227 RE S	UMMAR	EZD	DE - ELIT	E SO	FTWARE KIT	DEVELO	PMENT	r in	c	DOE	-2.1D DELTA	11/2	8/199	5	15:32:	37 SDI	RUN 1
монтн	AT.T.	COOLI HOURS			PA	C E FAN HOUF (F)		M P FAN OFF HOURS (F)	B O R A H	VERAGE ETWEEN UTDOOR& OOM AIR LL OURS (F)	BET OUT ROO FAN HOU	ATURE WEEN DOORS M AIF ON IRS	¥ {	FFERENC BETWEEN OUTDOOR ROOM AI FAN OFF HOURS (F)	E	SUMMED SETWEEN SUTDOOR SOOM AI SEATING SOURS (F)	& R	BETTO OUT IN ROOM ALL HOU	WEEN DOOR M AII RS F)	H R (FR	UMIDITY DIFFE BETWE OUTDO ROOM AC.OR	RATIO CRENCE CEN COR A AIR MULT.
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC	69.34 69.49 69.73 70.06 70.48 70.15 70.22 70.29 70.55 70.17 69.43			70 70 70 69 69	.96 .43 .94 .55	70. 70. 69. 69.	33 70 95 59 20 98 43 94 55	69.35 69.49 69.73 70.47 70.14 70.22 70.28 70.18 69.78		-73.88 -67.49 -60.46 -42.52 -22.82 -10.61 -14.39 -27.60 -45.50 -76.06	-5 -4 -1 - -2 -4 -5 -7	2.16 1.50 7.05 1.43 0.00 4.86 5.30 4.32 7.33		-73.99 -67.64 -61.01 -42.58 -23.18 -12.71 -10.61 -14.50 -27.73 -45.57 -62.83		126.09 102.86 99.97 69.17 31.25 0.49 2.19 42.17 77.55 95.55		229 188 187 127 739 46: 82: 141: 187: 235	3.94 7.98 0.43 5.66 7.95		- 00 - 00 - 00 - 00 - 00 - 00 - 00	0.00451 0.00386 0.00363 0.00293 0.0029 0.00105 0.00013 0.00129 0.00279 0.00372
Ei	MC FNVFD	O. ENGINE C RELATI	ERS		.79 INC. 0227 IY S		EZDO	69.98 DE - ELIT	E SO	FTWARE	DEVELO	PMENT	. IN	-42.68	DOE		11/2					.00228 RUN 1
							TOTAL	L HOURS A	T RE	LATIVE	HUMIDI	TY LE	EVEL	AND TI	ME OF	DAY						
		60 50 40		M 2	0 0 0 0 0 0	000000	5 0 0 0 0 0		000000000000000000000000000000000000000	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 12 0 0 0 0 0 0 0 0 0 5 0 22 0 66 105	00000	000000000000000000000000000000000000000	0	0 0 0	0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0	000000	0000	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	- 1 1 1
		ENGINE C TEMPER		80 SCA	INC. 0227 ITER	PLOT	EZDO	DE - ELIT	E 50	FTWARE FOR KIT	DEVELO CHEN	PMENT	IN	c	DOE	-2.1D DELTA	11/2 , AK	8/199! 	 5	15:32:	37 SDL	RUN 1
	ABOVE 81-85 76-80 71-75 66-70 61-65 BELOW			M 2	U	0 0 0 0 0 0 0	00000000	HOURS A 7 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	000000000000000000000000000000000000000	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 79 14 14 91 0 0 0 0	0000000	0000000	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0	0	ō		11 12 0 0 0 0 0 0 0 0		
EN DI REPORT	MC ENVER, - SS-A	ENGINE: CO SYSTEM	ERS MONT	8(HLY I	INC. 0227 LOAD:	S SUMM	EZDO	DE - ELIT	E SO:	FTWARE GYM	_HV DEVELO	PMENT	IN	c	DOE	-2.1D DELTA	11/2 , AK	8/1995	 5	15:32:	37 SDL	RUN 1
MONTH	COOL ENE (MB	ING RGY O	- C TIME MAX HR	DI Bi	RY-	N G - WET- BULB TEMP		MAXIMUM COOLING LOAD (KBTU/HR)		EN	TING ERGY BTU)		ME IAX	A T I I DRY- BULB TEMP	WPT-		MAXI HEAT L KBTU/	MUM ING OAD	-	ELEC TRICA ENERG (KWH	L Y	XIMUM ELEC LOAD (KW)
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC TOTAL MAX	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	000 000 000 000 000 000 000 000 000						0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000		0 -11	.413 .386 .960 .185 .784 .000 .256 .029 .195 .454	5 19 14 3 26 22 29 23	14 10 11 7 38 95	-19.F -14.F -14.F -76.F 51.F 46.F -27.F -22.F -22.F	-14.F -15.F 31.F 48.F 44.F -3.F		- 783 748 694 555 328 134 666 299 437 605 789 789 789 789 789 789 789 789 789 789 789	9532509655090499938-	-	6047 5467 58047 58047 9 10 118547 56045 6047 553		8.127 8.127 8.127 8.127 8.127 8.127 8.127 8.127 8.127 8.127 8.127 8.127

REPORT	MC ENVER, '- SS-C	ENGINEERS CO SYSTEM MOI	INC. 80227 NTHLY LOAD HO	EZDOE OURS FOR	- ELITE S	GYM_HV	ELOPMENT 1	INC	DOE-2.1D BIG DELTA	11/28/199 , AK	5 15:32	:37 SDL RUN 1
- 10NTH	HOURS COOLING LOAD		HOURS COINCIDENT COOL-HEAT LOAD								COINCID HEATING LOAD AT COOLING PEAK (KBTU/HR)	ENT LOADS ELECTRIC LOAD AT COOLING PEAK (KW)
JAN FEB ARR APR APR JUN JUL AUG SEP OCT NOV DEC	00000000000	744 672 744 720 744 107 0 134 715 744 720 744	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 6 13 744 6 10 5 0 0 0	744 672 744 720 744 720 744 720 744 720	000000000000000000000000000000000000000	744 672 744 720 744 120 144 720 744 720 744	000000000000000000000000000000000000000	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 13 0 10 5 0	-328.313 -296.136 -240.760 -207.267 -135.091 0.000 -31.388 -64.419 -156.706 -129.822 -164.897	8.127 8.127 8.127 8.127 8.127 0.000 0.000 8.127 8.127 8.127 8.127
E	0 MC ENVER	6788 ENGINEERS	0	1972 EZDOE	8760 - ELITE S		ELOPMENT I	INC	DOE-2.1D	11/28/199		:37 SDL RUN
10NTH	ALL HOURS (F)	E R A G E COOLING HOURS (F)	S P A C I HEATING I HOURS I	E TEM FAN ON F HOURS H	AN OFF	AVERAGE TEM BETWEEN OUTDOOR& ROOM AIR ALL HOURS	PERATURE I BETWEEN OUTDOOR& ROOM AIR FAN ON HOURS	DIFFERENCE BETWEEN OUTDOOR& ROOM AIR FAN OFF HOURS	SUMMED 'BETWEEN OUTDOOR ROOM AI' HEATING HOURS	TEMP DIFFE BET & OUT R ROO ALL HOU	RENCE WEEN DOOR& MAIR RS F) (F.	HUMIDITY RATI DIFFERENCE BETWEEN OUTDOOR AN ROOM AIR RAC.OR MULT.
IAN FEB MAR APR MAY IUN IUL MUG SEP OCT DEC	71.39 71.44 71.39 71.33 55.85 54.26 71.31 71.33		71.39 71.43 71.44 71.39 71.33 71.37 71.28 71.26 71.31 71.28 71.33	71.39 71.43 71.44 71.39 71.33 71.40 0.00 71.32 71.26 71.31 71.28 71.33	0.00 0.00 0.00 0.00 52.74 54.75 53.37 0.00 0.00	-75.93 -69.43 -69.18 -43.85 -23.67 1.68 4.86 -0.93 -28.31 -46.64 -64.04	-75.93 -69.43 -62.18 -43.85 -29.26 0.00 -16.09 -28.31 -46.64 -64.04	0.00 0.00 0.00 0.00 0.00 3.87 4.86 2.68 0.00 0.00	2353.69 1944.14 1927.50 1315.62 733.67 52.42 99.60 848.18 1445.71 1921.13	235 194 192 131 73 23 27. 84 144 192	3.69 4.14 7.50 75.62 7.62 7.09 9.23 9.23 9.23 1.13	-0.004 -0.004 -0.003 -0.003 -0.002 -0.001 0.000 0.001 -0.001 -0.001 -0.003
			71.35	71.35	53.71	-40.37	-52.99	3.88	15058.60	1564	0.80	-0.0019
EPORT	ENVER,	CO RELATIVE I	INC. 80227 HUMIDITY SCAT	TTER PLOT	FOR	GYM_HV			BIG DELTA			
	81- 71- 61- 51- 41- 31- 0-3	100 80 70	1AM 2 3 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 1 1 43 92 137 5 39 191 146 18	0 0 0 0 0 0 0 0 0	0 0 0 0 0 0	ELATIVE HUM 9 10 11	0 0	0 0 0	0 0 0	0 0 0	0 0	0 0 0 0 0 0 0 6 2 65 00 2882 82 3863
D REPORT	ENVER, '- SS-O	TEMPERATU	INC. 80227 RE SCATTER PI			OFTWARE DEV	ELOPMENT I		DOE-2.1D BIG DELTA		5 15:32	:37 SDL RUN
	ABOVE 81-85 76-80 71-75 66-65 BELOW	HOUR :	1AM 2 3 4 0 0 0 0 0 0 0 0 0 0 83 283 284 28 1 1 0 0 0 0	4 5 6 0 0 0 0 0 0	7 8 0 0 0 0 0 0 257 271 2 27 13 0 0	31 15 32	12 1PM 2 0 0 0 0 0 0 272 257 27 12 27 1	2 3 4 0 0 0 0 0 0 0 0 0 72 255 283	5 6 0 0 0 0 0 0 284 283 2 0 1 0 0	0 0 0 0 0 0 0 0 0 84 283 284 0 1 0	0 0 0 0 284 284 2 0 0	0 0 0 0 0 0

REPOR	EMC DENVER, T- SS-O	ENGINEERS CO TEMPERATU	INC. 80227 RE SCATTER	EZDO	DE - ELITE S	SOFTWARE DEV	ELOPMENT I	INC	DOE-2.1D BIG DELTA	11/28/1995 A, AK	15:32:37	SDL RUN 1
	ABOVE 81-85 76-80 71-70 66-70 61-65	HOUR - 85 2	1AM 2 3 0 0 0 0 0 0 0 0 0 0 67 241 265 16 43 19 1 0 0 0 0 0	TOTAL 4 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	HOURS AT 7 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	EMPERATURE 9 10 11	LEVEL AND 12 1PM 2 	TIME OF 1 3 4 0 0 0 0 0 0 0 5 229 230 9 55 54 0 0 0	DAY 5 6 0 0 0 0 0 0 0 0 0 0 266 240 2 18 44 0 0 0	7 8 9 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10 11 12 0 0 0 0 0 0 0 0 0 0 0 0 241 270 242 43 14 42 0 0 0 0	1084
REPOR	EMC DENVER, I- SS-A	ENGINEERS CO SYSTEM MO	INC. 80227 NTHLY LOADS	EZDO SUMMARY F	DE - ELITE S	OFTWARE DEV	ELOPMENT I	NC	DOE-2.1D BIG DELTA	11/28/1995 ., AK	15:32:37	SDL RUN 1
MONTH	COOL ENE (MB		COOLIN ME DRY- AX BULB HR TEMP		MAXIMUM COOLING LOAD KBTU/HR)	HEATIN ENERG (MBTU		E A T I N DRY- BULB TEMP	G WET- BULB TEMP (MAXIMUM HEATING LOAD KBTU/HR)	ELEC- TRICAL ENERGY (KWH)	E C MAXIMUM ELEC LOAD (KW)
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC TOTAL MAX	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	000 000 000 000 000 000 000 000 000 00			0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	-98.28 -80.91 -75.44 -53.66 -29.63 -20.63 -18.23 -18.00 -26.03 -50.76 -73.51 -92.59	3 5 11 1 19 11 1 14 3 7 15 3 3 27 7 96 27 10 2 25 12 2 23 15 10 11	-13.F - -14.F - -12.F - 7.F 36.F	14.F 14.F 13.F 31.F 31.F 40.F 41.F 41.F 22.F	-195.576 -187.399 -186.024 -162.127 -95.031 -62.258 -53.425 -54.334 -81.456 -128.039 -174.631 -191.043	1975. 1784. 1975. 1912. 1975. 319. 382. 1912. 1975.	2.655 2.655 2.655 2.655 2.655 0.000 2.655 2.655 2.655 2.655
REPORT		ENGINEERS CO SYSTEM MOD	VIRLI LOAD	EZDO	E - ELITE S	MPHVU			DOE-2.1D BIG DELTA	, AK 	15:32:37	
		HOURS HEATING LOAD	HOURS COINCIDEN COOL-HEAT LOAD	T HOURS FLOATIN	HOURS HEATING G AVAIL.	HOURS COOLING AVAIL.	R S HOURS FANS ON	HOURS FANS CYCLE ON	HOURS NIGHT VENTING	HOURS E FLOATING I WHEN C FANS ON	COINCIDENT HEATING EI LOAD AT LO COOLING CO PEAK (KBTU/HR)	LOADS LECTRIC DAD AT OOLING PEAK (KW)
JAN FEB APR APR JUL AUG SEP OCT NOV DEC	000000000000000000000000000000000000000	744 672 744 720 744 688 697 701 707 744 720 744 	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 32 47 43 13 0 0 0	744 672 744 720 744 720 744 720 744 720 744 720 744	000000000000000000000000000000000000000	744 672 744 720 744 120 0 144 720 744 720 744		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 17 22 13	-94.984 -78.743 -65.605 -54.187 -27.743 -7.881 -0.153 -7.026 -73.192 -87.258	2.655 2.6555 2.6555 2.6555 0.0000 2.6555 2.6555 2.6555 2.6555 2.6555 2.6555 2.6555
E D REPORT	MC ENVER,	ENGINEERS CO SPACE TEMP	INC. 80227 PERATURE SU	EZDO MMARY		OFTWARE DEVI	LOPMENT IN	4C	DOE-2.1D BIG DELTA,	11/28/1995	15:32:37	SDL RUN 1
MONTH		ERAGE	S P A C HEATING HOURS (F)	FAN ON HOURS	M P	AVERAGE TEMI BETWEEN B DUTDOOR& C ROOM AIR F ALL B HOURS F	PERATURE DI BETWEEN DUTDOOR& ROOM AIR PAN ON HOURS	FFERENCE BETWEEN OUTDOOR& ROOM AIR FAN OFF HOURS	SUMMED TO BETWEEN OUTDOORS ROOM AIF HEATING HOURS	FEMP DIFFERE BETWE OUTDO R ROOM ALL HOURS	NCE EN HUMI OR& D AIR E	
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV	69.69 69.82 70.01 70.29 70.61 70.32 70.32 70.35		69.69 69.82 70.01 70.29 70.61 70.21 70.32 70.35	69.69 69.82 70.01 70.29 70.61 71.18 0.00 71.00 70.65 70.35	0.00 0.00 0.00 0.00 0.00 70.08 70.32 70.23 0.00	-74.23 -67.82 -60.74 -42.75 -22.95 -12.73 -10.70 -14.48 -27.70 -45.68	-74.23 -67.82 -60.74 -42.75 -22.95 -9.05 0.00 -15.77 -27.70 -45.68	0.00 0.00 0.00 0.00 0.00 -13.46 -10.70 -14.17 0.00	2301.19 1898.99 1883.06 1282.44 711.44 394.43 345.62 451.83 825.56	2301. 1898. 1883. 1282. 711. 402. 361. 466. 831. 1416. 1883. 2368.	19 99 06 44 44 77 77 37	-0.00405 -0.00391 -0.00342 -0.00278 -0.00092 0.00066 0.00210 0.00114 -0.00087
DEC	70.03 69.76		70.03 69.76	70.03 69.76	0.00 0.00	-62.79 -76.39	-62.79 -76.39	0.00	1883.68 2368.23	1883. 2368.	68 23	-0.00256 -0.00361 -0.00386

EMC DENVER REPORT- SS	ENGIN R, -N RELAT	CO	INC. 80227 ITY SCATTE			SOFTWARE D		T INC		.1D 11/2	28/1995	15:32:37	SDL RUN 1
6 5 4	HOUR 81-100 71-80 61-70 51-60 41-50 31-40 0-30	0 0	0 0 0 0 0 0 0 0 0 0 0 0 1 1 2 8 18 17 5 265 265	5 6 0 0 0 0 0 0 0 0 0 0 1 19 24	7 8 0 0 0 0 0 0 0 0 1 1 25 21	9 10 11 0 0 0 0 0 0 0 0 1 2 22 27 2 661 255 25	12 1P 0 0 0 0 0 0 0 0 0 0 0 0 0 3 2 2 3 22 25 8 260 257	M 2 3 0 0 0 0 0 0 3 3 20 23 261 258	0 0 0 0 0 0 0 0 0 0 4 4 20 27	6 7 8 0 0 0 0 0 0 0 0 3 2	0 0 0 0 0 0 0 0 0 2 2 1 28 27 26	0 0 0 0 0 0 0 0 0 1 2 2	TOTAL 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
EMC DENVER REPORT- SS-	ENGIN R, -Ó TEMPE	EERS CO RATURE SC	INC. 80227 ATTER PLOT	EZDOE MPHVU	- ELITE S	OFTWARE D		T INC		.1D 11/2 ELTA, AK	28/1995	15:32:37	SDL RUN 1
81- 76- 71- 66- 61-	HOUR 0VE 85 -85 -80 -75 -70 -65 LOW 60	0 0 0 224 22 60 6	0 0 0 0 0 0 0 0 0 1 218 213	5 6 0 0 0 0 0 0 212 207 72 77 0 0 0 0	0 0 0 0 0 0 145 141 1 139 143 1	9 10 11 0 0 0 0 0 0 45 150 15 39 134 13 0 0	12 1P 0 0 0 0 0 0 0 0 0 0 1 148 151 3 136 133 0 0 0 0 0	M 2 3 0 0 0 0 161 163 123 121 0 0	4 5 0 0 0 0 0 0 0 0 194 204 2	65 64 6 0 0 0 0	0 0 0 0 0 0 0 0 0 22 223 223 52 61 61 0 0 0	0 0 0 0 0 0 3 225 223 1 59 61 0 0 0	TOTAL 0 0 0 4603 2213 0 0
EMC DENVER REPORT- PV-	ENGIN R, -A EOUIP	CO	80227	EZDOE	- ELITE S	OFTWARE D	EVELOPMEN	TINC		.1D 11/2	28/1995	15:32:37	PDL RUN 1
	U I P M E K-STORAGE	(M)	NUME IZE INSTE BTU/H) AV	AIL (MBT	NUMBE E INSTD U/H) AVA	SIZE	NUMBER INSTD H) AVAIL	SIZE I	NUMBER INSTD (SIZE INS	MBER STD SI AVAIL (ME	NUMB IZE INSTD BTU/H) AV	
EMC DENVER REPORT- PS-	R,	CO I	INC. 80227 TILIZATION		- ELITE S	OFTWARE D	EVELOPMEN	T INC		.1D 11/2	28/1995	15:32:37	PDL RUN 1
DENVER	R,	CO I	80227				EVELOPMEN				28/1995	15:32:37	PDL RUN 1
DENVER	R,	CO I	80227								12 TOTAL FUEL INPUT	13 TOTAL SITE ENERGY	*
DENVER REPORT- PS-	R, -A PLANT 2 TOTAL HEAT	ENERGY U TOTAL COOLING	80227 TILIZATION 4 TOTAL ELECTR LOAD 57.9	SUMMARY 5 RCVRED	S 6 WASTED RCVRABL	I T E E 7 FUEL INPUT	NERG 8 ELEC INPUT COOLING 0.0	Y 9 FUEL INPUT HEATING	10 ELEC INPUT HEATING	PUEL INPUT ELECT	12 TOTAL FUEL	13 TOTAL SITE ENERGY	* SOURCE * 14 * TOTAL * SOURCE
DENVER REPORT- PS-	2 TOTAL HEAT LOAD	ENERGY U 3 TOTAL COOLING LOAD	80227 TILIZATION 4 TOTAL ELECTR LOAD 57.9 17.0E 52.3	5 RCVRED ENERGY	S 6 WASTED RCVRABL ENERGY	I T E E 7 FUEL INPUT COOLING	NERG 8 ELEC INPUT COOLING 0.0 0.0E	Y 9 FUEL INPUT HEATING	BIG D	PUEL INPUT ELECT	12 TOTAL FUEL INPUT	13 TOTAL SITE ENERGY	* SOURCE * 14 * TOTAL * SOURCE * ENERGY
DENVER REPORT- PS-	2 TOTAL HEAT LOAD 936.0	SO ENERGY U 3 TOTAL COOLING LOAD 0.0	4 TOTAL ELECTR LOAD 57.9 17.0E 52.3 15.3E	5 RCVRED ENERGY	S 6 WASTED RCVRABL ENERGY 0.0	I T E E 7 FUEL INPUT COOLING	NERGO 8 ELEC INPUT COOLING 0.0 0.00 0.00	Y 9 FUEL INPUT HEATING 0.0 0.0	10 ELEC INPUT HEATING 6.5 1.9E 5.8 1.7E 6.5	II FUEL INPUT ELECT 0.0 0.0	12 TOTAL FUEL INPUT	13 TOTAL SITE ENERGY	* SOURCE * 14 * TOTAL * SOURCE * ENERGY * 1733.8 * 1435.9
DENVER REPORT- PS-	2 TOTAL HEAT LOAD 936.0	SO ENERGY U 3 TOTAL COOLING LOAD 0.0	80227 TILIZATION 4 TOTAL ELECTR LOAD 57.9 17.0E 52.3 15.3E 57.9 17.0E	5 RCVRED ENERGY 0.0	S 6 WASTED RCVRABL ENERGY 0.0	I T E E 7 FUEL INPUT COOLING 0.0	NERGONE RESERVATION OF THE PROPERTY OF THE PRO	Y 9 FUEL INPUT HEATING 0.0 0.0	10 ELEC INPUT HEATING	PUELL INPUT ELECT	12 TOTAL FUEL INPUT 0.0	13 TOTAL SITE ENERGY 993.9	* SOURCE * 14 * TOTAL * SOURCE * ENERGY * 1733.8 * 1435.9
MONTH JAN FEB MAR	Z TOTAL HEAT LOAD 936.0 767.4	SO ENERGY U 3 TOTAL COOLING LOAD 0.0 0.0	80227 TILIZATION 4 TOTAL ELECTR LOAD 57.9 17.0E 52.3 15.3E 57.9 17.0E	5 RCVRED ENERGY 0.0 0.0	S 6 WASTED RCVRABL ENERGY 0.0 0.0	I T E E 7 FUEL INPUT COOLING 0.0 0.0	NERGO 8 ELEC INDUT COOLING 0.0 0.0E 0.0 0.0E	Y 9 FUEL INPUT HEATING 0.0 0.0 0.0	10 ELEC INPUT HEATING 	PUELL INPUT ELECT 0.0 0.0 0.0 0.0	12 TOTAL FUEL INPUT 0.0 0.0	13 TOTAL SITE ENERGY 993.9 819.6 768.0	* SOURCE * 14 * TOTAL * SOURCE * ENERGY * 1733.8 * 1435.9 * 1357.3 * 999.3
MONTH JAN FEB MAR APR	2 TOTAL HEAT LOAD 936.0 767.4 710.1	SO ENERGY U 3 TOTAL COOLING LOAD 0.0 0.0 0.0	80227 TILIZATION 4 TOTAL ELECTR LOAD 	SUMMARY 5 RCVRED ENERGY 0.0 0.0 0.0	S 6 WASTED RCVRABL ENERGY 0.0 0.0 0.0	I T E E 7 FUEL INPUT COOLING 0.0 0.0 0.0	N E R G 8 ELEC INPUT COOLING 0.00 0.00E 0.00 0.00E 0.00 0.00E 0.00 0.00E	Y 9 FUEL INPUT HEATING 0.0 0.0 0.0	10 ELEC INPUT HEATING 	PUELL INPUT ELECT O.O O.O O.O O.O	TOTAL FUEL INPUT 0.0 0.0 0.0	13 TOTAL SITE ENERGY 993.9 819.6 768.0	* SOURCE * 14 * TOTAL * SOURCE * ENERGY * 1733.8 * 1435.9 * 1357.3 * 999.3
MONTH JAN FEB MAR APR MAY	2 TOTAL HEAT LOAD 936.0 767.4 710.1 498.6 277.1	SO ENERGY U	4 TOTAL ELECTR LOAD 17.0E 57.9 17.0E 52.3 15.3E 57.9 17.0E 56.0 16.4E 57.9	SUMMARY 5 RCVRED ENERGY 0.0 0.0 0.0 0.0	S 6 WASTED RCVRABL ENERGY 0.0 0.0 0.0	ITE E 7 FUEL INPUT COOLING 0.0 0.0 0.0 0.0	N E R G 8 ELEC INPUT COOLING 0.0E 0.0 0.0E 0.0 0.0E 0.0 0.0E 0.0 0.0	Y 9 FUEL INPUT HEATING	10 ELEC INPUT HEATING 6.5 1.9E 5.8 1.7E 6.5 1.9E 6.2 1.8E 6.5	PUELL INPUT ELECT O.O O.O O.O O.O O.O	12 TOTAL FUEL INPUT 0.0 0.0 0.0 0.0	13 TOTAL SITE ENERGY 993.9 819.6 768.0 554.6 335.0	* SOURCE * 14 * TOTAL * SOURCE * ENERGY * 1733.8 * 1435.9 * 1357.3 * 999.3 * 635.7
MONTH JAN FEB MAR APR MAY JUN	2 TOTAL HEAT LOAD 936.0 767.4 710.1 498.6 277.1	SO ENERGY U TOTAL COOLING LOAD 0.0 0.0 0.0 0.0 0.0	## A TOTAL ELECTR LOAD	5 RCVRED ENERGY 0.0 0.0 0.0 0.0 0.0	S 6 WASTED RCVRABL ENERGY O.O O.O O.O O.O	I T E E 7 FUEL INPUT COOLING 0.0 0.0 0.0 0.0	N E R G 8 ELEC INPUT COOLING 0.0 0.0E 0.0 0.0E 0.0 0.0E 0.0 0.0E	9 FUEL INPUT HEATING 0.0 0.0 0.0 0.0	10 ELEC INPUT HEATING 	PUELL INPUT ELECT O.O O.O O.O O.O O.O O.O	12 TOTAL FUEL INPUT 0.0 0.0 0.0 0.0 0.0 0.0	13 TOTAL SITE ENERGY 993.9 819.6 768.0 554.6 335.0	* SOURCE * 14 * TOTAL * SOURCE * ENERGY * 1733.8 * 1435.9 * 1357.3 * 999.3 * 635.7 * 207.4 * 146.4 * * * * * * * * * * * * * * * * * * *
MONTH JAN FEB MAR APR MAY JUN JUL	2 TOTAL HEAT LOAD 936.0 767.4 710.1 498.6 277.1 98.5 76.9	TOTAL COOLING LOAD O.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	## A TOTAL ELECTR LOAD 17.0E 52.3 15.3E 57.9 17.0E 56.0 16.4E 57.9 17.0E 14.4 4.2E 6.0	5 RCVRED ENERGY 0.0 0.0 0.0 0.0 0.0 0.0	S 6 WASTED RCVRABL ENERGY O.0 O.0 O.0 O.0 O.0	I T E E 7 FUEL INPUT COOLING 0.0 0.0 0.0 0.0 0.0	N E R G 8 ELEC INPUT COOLING 0.0 0.0E	Y 9 FUEL INPUT HEATING	BIG D. 10 ELEC INPUT HEATING	PUEL INPUT ELECT 0.0 0.0 0.0 0.0 0.0 0.0 0.0	12 TOTAL FUEL INPUT 0.0 0.0 0.0 0.0 0.0 0.0	13 TOTAL SITE ENERGY 993.9 819.6 768.0 554.6 335.0 112.9 83.0	* SOURCE * 14 * TOTAL * SOURCE * ENERGY * 1733.8 * 1435.9 * 1357.3 * 999.3 * 207.4 * 146.4
MONTH JAN FEB MAR APR MAY JUN JUL AUG	2 TOTAL HEAT LOAD 936.0 767.4 710.1 498.6 277.1 98.5 76.9 103.1	SO ENERGY U	## A PROPERTY OF THE PROPERTY	5 RCVRED ENERGY 0.0 0.0 0.0 0.0 0.0 0.0 0.0	S 6 WASTED RCVRABL ENERGY 0.0 0.0 0.0 0.0 0.0 0.0	ITE E 7 FUEL INPUT COOLING 0.0 0.0 0.0 0.0 0.0 0.0	N E R G 8 ELEC INPUT COOLING 0.0 0.0E 0.0 0.0E 0.0 0.0E 0.0 0.0E 0.0 0.0	Y 9 FUEL INPUT HEATING	BIG D 10 ELEC INPUT HEATING 6.5 1.9E 5.8 1.7E 6.5 1.9E 6.2 1.8E 6.5 1.9E 6.1 1.8E 6.0 1.8E 6.2	11 FUEL INPUT ELECT 0.0 0.0 0.0 0.0 0.0 0.0 0.0	12 TOTAL FUEL INPUT 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	13 TOTAL SITE ENERGY 993.9 819.6 768.0 554.6 335.0 112.9 83.0 119.3	* SOURCE * 14 * TOTAL SOURCE * ENERGY * 1733.8 * 1435.9 * 1357.3 * 999.3 * 635.7 * 207.4 * 146.4 * 220.4
MONTH JAN FEB MAR APR MAY JUN JUL AUG SEP	2 TOTAL HEAT LOAD 936.0 767.4 710.1 498.6 277.1 98.5 76.9 103.1 261.8	CO ENERGY U TOTAL COOLING LOAD O.O O.O O.O O.O O.O O.O O.O	80227 TILIZATION 4 TOTAL ELECTR LOAD 57.9 17.0E 56.0 16.4E 57.9 17.0E 14.4 4.2E 6.0 1.8E 16.1 4.7E 56.0 16.4E 57.9	5 RCVRED ENERGY 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	S 6 WASTED RCVRABL ENERGY 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	I T E E 7 FUEL INPUT COOLING 0.0 0.0 0.0 0.0 0.0 0.0 0.0	N E R G 8 ELEC INPUT COOLING 0.0 0.0E 0.0 0.0E 0.0 0.0E 0.0 0.0E 0.0 0.0	Y 9 FUEL INPUT HEATING 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	BIG D 10 ELEC INPUT HEATING 6.5 1.9E 5.8 1.7E 6.5 1.9E 6.2 1.8E 6.0 1.8E 6.2 1.8E 6.2 1.8E 6.2	11 FUEL INPUT ELECT 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	12 TOTAL FUEL INPUT 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	13 TOTAL SITE ENERGY 993.9 819.6 768.0 554.6 335.0 112.9 83.0 119.3 317.8	* SOURCE * 14 * TOTAL SOURCE * ENERGY * 1733.8 * 1435.9 * 1357.3 * 999.3 * 635.7 * 207.4 * 146.4 * 220.4
MONTH JAN FEB MAR APR MAY JUN JUL AUG SEP OCT	2 TOTAL HEAT LOAD 936.0 767.4 710.1 498.6 277.1 98.5 76.9 103.1 261.8 494.2	3 TOTAL COOLING LOAD 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	## A TOTAL ELECTR LOAD	5 RCVRED ENERGY 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	S 6 WASTED RCVRABL ENERGY	I T E E 7 FUEL INPUT COOLING 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	N E R G 8 ELEC INPUT COOLING 0.0E 0.0 0.0E	Y 9 FUEL INPUT HEATING	10 ELEC INPUT HEATING	ELTA, AK 11 FUEL INPUT ELECT 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	12 TOTAL FUEL INPUT 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	13 TOTAL SITE ENERGY 993.9 819.6 768.0 554.6 335.0 112.9 83.0 119.3 317.8 552.1 755.9	* SOURCE * 14 * 14 * TOTAL * SOURCE * ENERGY * 1733.8 * 1435.9 * 1357.3 * 999.3 * 635.7 * 207.4 * 146.4 * 220.4 * 604.4 * 997.6 * *

NOTE-- ALL ENTRIES ARE IN MBTU EXCEPT ENTRIES FOLLOWED BY E ARE IN MWH (THOUSANDS OF KWH)

APPENDIX D WATER AND SEWER ANALYSIS

summary





#P406.003 Ft. Greely Utility Study 3/18/96 DGM

					816,163 Gal/month from bldg spread sheet	0 kwh from electrical spread sheet	\$0 @ \$0.0743/kwh	@ \$6.25/kw-month			1,104,820 Gal/month from bldg spread sheet	41,184 kwh from electrical spread sheet	\$2,928 @ \$0.0743/kwh	\$464 @0 \$0.035/1000 gal.	@ \$6.25/kw-month	
Modified complex with each remaining building provided with domestic water through the utilidor, and a soil absortion field ****	257,518 sf	1,053,676 sf	1,311,194 sf		816,163 Gal/month	0 kwh	0\$		0\$		1,104,820 Gal/month	41,184 kwh	\$2,928	\$464	\$4,712	\$8,104
	257,518 sf	1,053,676 sf	1,311,194 sf		816,163 Gal/month	0 kwh	0\$		80		996,820 Gal/month	34,395 kwh	\$2,445	O\$	\$2,945	\$5,390
uildings in Modified complex with each remaining building each remaining building supplied with utilities provided with water well, fire protection cistern and soil absorption field	257,518 sf	1,053,676 sf	1,311,194 sf		816,163 Gal/month	251,919 kwh	\$17,911	\$1,590	\$19,502		996,820 Gal/month	40,336 kwh	\$2,868	\$419	\$4,712	866'2\$
Baseline: All buildings in luse	1,311,194 sf	JS O	1,311,194 sf		7,197,281 Gal/month	251,919 kwh	\$17,911	\$1,590	\$19,502		9,585,079 Gal/month	387,853 kwh	\$27,576	\$4,026	\$4,712	\$36,314
	Area of buildings used (SF)	Area of buildings abandoned (SF)	Total Area (SF)	SANITARY SYSTEMS	Sanitary waste usage per month	Sanitary sewer system electrical usage (kwh)	Cost of electricity per year	Demand Charge	Total Cost of Energy per Year	DOMESTIC SYSTEMS	Domestic water usage per month	Domestic water system electrical usage (kwh)	Cost of electricity per year	Cost of Chlorination per year	Demand Charge	Total Cost of Energy per Year

Number of individual water wells = 10
**** option of leaving a valve open at each building to prevent pipes from freezing

#1406.003 Ft. Greely Utility Study 3/25/96 DGM

UTILITY CONSUMPTION RATES FOR EXISTING BASE

BUILDING NUMBER	BUILDING DESCRIPTION	SQFT	SPACE CLASSIFICATION	SANITARY WASTE IN GAL/MONTH	DOMESTIC WATER IN GAL/MONTH
501 503	POST HEADQUARTERS	382	OFFICE	327	442
504	GYMNASIUM FIRE STATION	.27,430 6,192	GYM FIRE STATION	12,344 5,307	16,664 7,169
510 601	WAREHOUSE AND OFFICES	00 954	WAREHOUSE/OFF	£4.540	70.50
602	GAS STATION	90,854	WAREHOUSE/OFF GAS STATION	54,512	73,592
603	POST ENGINEER	12,780	OFFICE	15,000 10,954	20,250
604	PLUMBING SHOP	27,344	MAINTENANCE	24,610	14,788 33,223
e 605	CONSOLIDATED PW	24,915	OFFICE	21,356	28,836
605A		A AND GO OFFICE CO. ATT. TET TO		21,000	25,50
: 608	CENTRAL HEATING PLANT	30,334	MAINTENANCE	27,301	36,85
607	HEATING PLANT ANNEX	999	MAINTENANCE	899	1,21
608 609	CRTC MAINTENANCE	4,222	MAINTENANCE	3,800	5,13
610	CRTC HEADQUARTERS CRTC PRODUCTION	3,530	OFFICE	3,026	4,08
V#1812 2	CRTC MAINTENANCE AND A	5,120 18.681	OFFICE MAINTENANCE	4,389	5,92
614	CRTC COMPUTERS	30,00	OFFICE	16,813	22,69
615	MOTOR POOL	17.351	MAINTENANCE	15,616	21,08
617	*POL OPERATION	448	MAINTENANCE	403	544
. · 618	POLOPERATION	621	MAINTENANCE	559	75.
625	WELL HOUSE #8	293	MAINTENANCE	264	356
6 26	AUTO CRAFT SHOP		MAINTENANCE		
627	MAS BOAT SHOP		MAINTENANCE		
628	NWTC BOAT SHOP		MAINTENANCE		
633	SEWAGE TREATMENT	2,784	MAINTENANCE	2,506	3,38
638	SEWAGE LAGOON	742	MAINTENANCE	6 68	902
639	CONTACT CHAMBER	696	MAINTENANCE	62 6	846
650 651	POST EXCHANGE	11,768	STORE	9,414	12,709
652	BOWLING LANES CLASSROOM	12,600	BOWLING ALLEY	22,500	30,375
65 3	NCO OPEN MESS	9,707 10,255	SCHOOL CAFETERIA	14,561	19,657
654	1100 01 211 11200	16,873	CAFETERIA	61,530	83,066
656	AFFEES POST EXCHANGE	10,632	STORE	8,506	11,48
658	MAINTENANCE	25 425	MAINTENANCE	22,883	30,89
659	HQ COMPANY ATC	43,128	OFFICE	36,967	49,90
6 60	HQ AND HQ COMPANY USA	53,507	OFFICE	45,863	61,91
661	SPECIAL SERVICES	43,411	OFFICE	37,209	50,233
662	BARRACKS	4 6,754	BARRACKS/HSG	436,371	589,100
663	COMMISSARY	44,080	STORE	35,264	47,606
670	PUBLIC WORKS WAREHOUSE		WAREHOUSE		
675 701	LAUNDRY OFFICERS OPEN MESS	40.740	LAUNDRY		
702	ARMY COMMUNITY SERVICE	10,742 16,625	CAFETERIA OFFICE	64,452	87,010
705	HOUSING UNIT	6,015	BARRACKS/HSG	14,250 56,140	19,238
706	HOUSING UNIT	6,015	BARRACKS/HSG	56,140	75,789 75,789
707	HOUSING UNIT	6,015	BARRACKS/HSG	56,140	75,789
708	HOUSING UNIT	6,015	BARRACKS/HSG	56,140	75,789
709	HOUSING UNIT	6,015	BARRACKS/HSG	56,140	75,789
710	MECHANICAL ROOM		MAINTENANCE		
711	HOUSING UNIT		BARRACKS/HSG		
712	GARAGE		MAINTENANCE		
713 714					
725	SCHOOL	54,604	SCHOOL	04.000	
801	BILLETING	15,955	OFFICE	81,906	110,573
802	YOUTH ACTIVITIES	10,500	OFFICE	13,676	18,462
804	BOQ	9,510	BARRACKS/HSG	88,760	140.000
805	BOQ	12,812	BARRACKS/HSG	119,579	119,826 161,431
806	BOQ	12,812	BARRACKS/HSG	119,579	161,431
808	HOUSING UNIT	12,812	BARRACKS/HSG	119,579	161,431
809	HOUSING UNIT	12,812	BARRACKS/HSG	119,579	161,431
810	HOUSING UNIT	12,812	BARRACKS/HSG	119,579	161,431
812		12,812	BARRACKS/HSG	119,579	161,431
813		12,812	BARRACKS/HSG	119,579	161,431
814	HOUSING UNIT	12,812	BARRACKS/HSG	119,579	161,431
816	HOUSING UNIT	12,812	BARRACKS/HSG	119,579	161,431
817	HOUSING UNIT	12,812	BARRACKS/HSG	119,579	161,431
818	HOUSING UNIT	12,812	BARRACKS/HSG	119,579	1 61,431
- 820 - 824	HOUSING UNIT	16,175	BARRACKS/HSG	150,967	203,805
821 822	HOUSING UNIT HOUSING UNIT	16,175	BARRACKS/HSG	150,967	203,805
823	MECHANICAL ROOM	16,175	BARRACKS/HSG	150,967	203 ,805
825	HOUSING UNIT	13 466	MAINTENANCE	405.000	
	HOUSING UNIT	13,466 18,265	BARRACKS/HSG	125,683	169,672
826	HOUSING UNIT	18,265 18,265	BARRACKS/HSG BARRACKS/HSG	170,473 170,473	230,139
82 6 82 7	HOUSING UNIT	18,265	BARRACKS/HSG	170,473	230,139
827		10,200		170,473	230,139
827 82 9		18 265	BARRACKS/HSC	470 470	AAA
827 82 9 83 0	HOUSING UNIT	18,265 18,265	BARRACKS/HSG	170,473 170,473	230,139
827 829 830 831	HOUSING UNIT HOUSING UNIT	18,265	BARRACKS/HSG	170,473	230,139
827 82 9 83 0	HOUSING UNIT				

BUILDING AREAS

EMC Engineers, Inc 2750 S Wadsworth Blvd Denver, Co 80227

#1406.003 Ft. Greely Utility Study 3/18/96 DGM

	TOTAL	1,311,194 sf	· · · · · · · · · · · · · · · · · · ·	7,197,281	9,585,079
WASTE AND WA	ATER FOR REFRIGATION SYSTEMS IN COMM	IISSARY		75,000	75,000
WASTE AND WA	TER FOR SEWARAGE TREATMENT			300,000	300,000
896	HOUSING UNIT	13,466	BARRACKS/HSG	125,683	169,672
8 95	HOUSING UNIT	13,466	BARRACKS/HSG	125,683	169,672
889	HOUSING UNIT	13,466	BARRACKS/HSG	125,683	169,672
888	HOUSING UNIT	13,466	BARRACKS/HSG	125,683	169,672
887	HOUSING UNIT	13,466	BARRACKS/HSG	125,683	169,672
878	MECHANICAL ROOM		MAINTENANCE		
877	HOUSING UNIT	13,466	BARRACKS/HSG	125,683	169,672
876	HOUSING UNIT	13,466	BARRACKS/HSG	125,683	169,672
875	HOUSING UNIT	13,466	BARRACKS/HSG	125,683	169,672
864	HOUSING UNIT	14,459	BARRACKS/HSG	134,951	182,183
863	HOUSING UNIT	14,459	BARRACKS/HSG	134,951	182,183
862	HOUSING UNIT	14,459	BARRACKS/HSG	134,951	182,183
857	MECHANICAL ROOM		MAINTENANCE		
856	HOUSING UNIT	13,466	BARRACKS/HSG	125,683	169,672
854	HOUSING UNIT	13,466	BARRACKS/HSG	125,683	169,672
853	MECHANICAL ROOM		MAINTENANCE		
852	HOUSING UNIT	10,336	BARRACKS/HSG	96,469	130,234
851	HOUSING UNIT	10,336	BARRACKS/HSG	96,469	130,234
850	HOUSING UNIT	10,336	BARRACKS/HSG	96,469	130,234
847	CHILD DEVELOPMENT CENTER		CHILD CARE		,
845	CHAPEL	11,737	CHURCH	117.370	158,450

l .			
CLASSIFICATION	PEOPLE	WASTE USAGE	WASTE USAGE/SF/DAY
OFFICE	700 SF/PERSON	20 GAL/PERSON/DAY	0.03 GAL/SF/DAY
SCHOOL	500 SF/PERSON	25 GAL/PERSON/DAY	0.05 GAL/SF/DAY
GAS STATION	2 BAYS	1000 GAL/GAS BAY/DAY	500.00 GAL/DAY
BOWLING ALLEY	10 LANES	75 GAL/LANE/DAY	750.00 GAL/DAY
BARRACKS/HSG	225 SF/BED	70 GAL/BED/DAY	0.31 GAL/SF/DAY
STORE	750 SF/EMPLOYEE	20 GAL/PERSON/DAY	0.03 GAL/SF/DAY
LAUNDRY	100 WASH CYCLES/DAY	50 GALWASH CYCLE/DAY	5000.00 GAL/DAY
CAFETERIA	50 SF/PERSON	10 GAL/PERSON/DAY	0.20 GAL/SF/DAY
CHILD CARE	60 SF/PERSON	15 GAL/PERSON/DAY	0.25 GAL/SF/DAY
CHURCH	15 SF/PERSON	5 GAL/PERSON/DAY	0.33 GAL/SF/DAY
MAINTENANÇE	0.03 GAL/SF/DAY	0.10 GAL/SF/DAY	0.03 GAL/SF/DAY
MAINT./OFF.	2000 SF/PERSON	20 GAL/PERSON/DAY	0.01 GAL/SF/DAY
WAREHOUSE	0.03 GAL/SF/DAY	0.10 GAL/SF/DAY	0.03 GAL/SF/DAY
WAREHOUSE/OFF	1000 SF/PERSON	20 GAL/PERSON/DAY	0.02 GAL/SF/DAY
FIRE STATION	700 SF/PERSON	20 GAL/PERSON/DAY	0.03 GAL/SF/DAY
UTILITY			
GYM	2000 SF/PERSON	30 GAL/PERSON/DAY	0.02 GAL/SF/DAY

UTILITY CONSUMPTION RATES FOR NEWLY CONFIGURED BASE

BUILDING NUMBER	BUILDING DESCRIPTION	SQFT	CLASSIFICATION	WASTE IN GAL/MONTH	WATER IN GAL/MONTH
501	HQ	19,095	OFFICE	16,367	22,096
503	GYM W/O POOL	27,430	GYM	12,344	16.664
504	FIRE STATION	6,195	FIRE STATION	5,310	7,169
605	CONSOLIDATED PW	24,915	OFFICE	21,356	28,830
606	CENTRAL HEATING PLANT	30,334	MAINTENANCE	27,301	36 .856
607	HEX PLANT ANNEX	999	MAINTENANCE	899	1,214
612	TANK MAINTENANCE	18,681	MAINTENANCE	16,813	22.697
615	ROADS AND GROUNDS	17.351	MAINTENANCE	15.616	21.081
625	PUMP HOUSE	293	UTILITY		2.,52.
633	SEWAGE TREATMENT	2.784	UTILITY	300.000	300.000
638	SEWAGE LAGOON	742	UTILITY	,	444,555
639	CONTACT CHAMBER	696	UTILITY		
658	TEMP MOTOR POOL	25.425	MAINTENANCE	22,883	30.891
820	UNACC PERS HSG	16,175	BARRACKS/HSG	150.967	203.805
821	UNACC PERS HSG	16.175	BARRACKS/HSG	150.967	203,805
725	STATE SCHOOL	50228	SCHOOL	75,342	101,712
	TOTAL	257,518 sf		816,163	996,820

EMC Engineers, Inc 2750 S Wadsworth Blvd Denver, CO 80227

DOMESTIC WATER SYSTEMS

BUILDIN	BUILDING BUILDING				COST OF	MINIMOM	WATER PUMP ho	MINIMUM BLADDER TANK SIZE
NOMBE	NUMBER DESCRIPTION	SQFT	SQFT CLASSIFICATION W	ION WATER IN GAL/MONTH	CHLORINATION	FLOW RATE OF PUMP	(@ 200 FT HEAD)	(GAL)
501	POST HQ	19,095	OFFICE	22,096	773 PER MONTH	20 GPM	5 HP	150
503	GYMNASIUM	27,430	GYM	16,664	583 PER MONTH	20 GPM	5 HP	120
204	FIRE STATION	6,192	FIRE STATION	7,165	251 PER MONTH		5 HP	100
605	CONSOLIDATED PW	24,915	OFFICE	28,830	1009 PER MONTH	20 GPM	5 HP	200
909	CENTRAL HEATING PLAN	31,333	UTILITY	0	0 PER MONTH	20 GPM	5 HP	100
612	TANK MAINTENANCE	18,681	MAINTENANCE	22,697	794 PER MONTH	20 GPM	5 HP	
615	ROADS AND GROUNDS	17,351	MAINTENANCE	21,081	738 PER MONTH		5 HP	
658	TEMP MOTOR POOL	25,425	MAINTENANCE	30,891	1081 PER MONTH	20 GPM	5 HP	210
725	SCHOOL	54,604	SCHOOL	110,573	3870 PER MONTH	20 GPM	5 HP	
820	HOUSING UNIT	16,175	BARRACKS/HSG	203,805	7133 PER MONTH		5 HP	1
821	HOUSING UNIT	16,175	BARRACKS/HSG	203,805	7133 PER MONTH	20 GPM	5 HP	
633	SEWAGE TREATMENT	2,784	UTILITY	300,000	10500 PER MONTH	N/A		
	TOTAL	260,160 sf		967,608				

DOMESTIC WATER SYSTEM COMPONENTS

WATER WELL DEPTH OF 400 FT +/- 60 FT **€06466**

400 FT DEEP +/- 60 FT OF 6"x0.375" WALL STEEL CASING 50 FT DEEP +/- 60 FT OF GEOWINESS STEEL, ROD BASED SCREEN, EXTRA HEAVY DUTY, WELL PACKED WITH GRAVEL. 1 STAGE, SUBMERSIBLE PUMP BOWL, MOTOR, #4/0 CABLE, 6" SURGE VALVE 6" DISCHARGE ELBOW AND JUNCTION BOX HYDRO-PNEUMATIC TANK, WITH FIXED BLADDER, FACTORY PRESSURIZED



SANITARY WASTE SYSTEMS

BUILDING	BUILDING BUILDING		1				
NUMBER	NUMBER DESCRIPTION	SQFT	ਹ∣	LASSIFICATION WASTE IN GAL/MONTH WASTE IN GAL/DAY	WASTE IN GAL/DAY	SEPTIC IANK SIZE	ABSORP I ION FIELD
501	POST HO	19,095	OFFICE	16,367	546	1,500 GAL	900 FT
503	GYMNASIUM	27,430	GYM	12,344	411	4,000 GAL	2,400 FT
504	FIRE STATION	6,192	FIRE STATION	5,307	177	750 GAL	450 FT
605	CONSOLIDATED PW	24,915	OFFICE	21,356	712	1,500 GAL	900 FT
909	CENTRAL HEATING PLAN	31,333	UTILITY	0	0	750 GAL	450 FT
612	TANK MAINTENANCE	18,681	MAINTENANCE	16,813	260	3,000 GAL	1,800 FT
615	ROADS AND GROUNDS	17,351	MAINTENANCE	15,616	521	3,000 GAL	1,800 FT
658	TEMP MOTOR POOL	25,425	MAINTENANCE	22,883	763	4,000 GAL	2,400 FT
725	SCHOOL	54,604	TOOHOS	81,906	2,730	4,000 GAL	2,400 FT
820	HOUSING UNIT	16,175	BARRACKS/HSG	150,967	5,032	5,000 GAL	3,000 FT
821	HOUSING UNIT	16,175	BARRACKS/HSG	150,967	5,032	5,000 GAL	3,000
633	SEWAGE TREATMENT	2,784	UTILITY	300,000	10,000	N/A	N/N
							,
	TOTAL	260,160 sf		794,524 GAL/MONTH	26,484 GAL/DAY		19,500 FT

SANITARY WASTE COMPONENTS

TWO COMPARTMENT SEPTIC TANK (SIZE VARIES PER BLDG).

DISTRIBUTION BOX

TWO LATERAL PERFORATED PIPES (LENGTHS VARY PER BLDG).

EXCAVATION FOR PERFORATED PIPES (TYPICAL CROSS SECTIONAL AREA OF TRENCH = 56^2 FT) BACKFILL 12" BOTTOM OF TRENCH WITH GRAVEL

508466586

4" DIAMETER PERFORATED PIPE IN 12" GRAVEL (LENGTH OF PIPE VARIES PER BLDG)

GEOTEXTILE FABRIC ABOVE 12" GRAVEL (LENGTH VARIES PER BLDG)

BACKFILL WITH SAND 24" UP FROM TOP OF 12" GRAVEL

BACKFILL WITH SELECT FILL FROM TOP OF SAND TO SURFACE (APPROX. 7 FT).

** ASSUMING CLAY SOIL WITH SMALL AMOUNTS OF SAND OR GRAVEL (120 SF OF LEACHING AREA FOR EVERY 100 GALS STORAGE)

waste

EMC Engineers, Inc 2750 S Wadsworth Blvd Denver, Co 80227

#1406.003
Ft. Greely Utility Study
3/18/96
DGM

ELECTRICAL POWER USAGE FOR DOMESTIC WATER AND SANITARY WASTE SYSTEMS

Pump Efficiency 0.65

Motor efficiency 0.95

head pressure conversion 55 psi = 127 ft head

EXISTING

Pump Designation	Pump Horse power	Pump Horse power Existing water usage Head presure on	Head presure on pumps	Pump Flow Rate	pumps Pump Flow Rate Average Pump Usage	Electrical kw	Demand Chame	EXISTING Flechical means from	
							Samuel Olicing	Lieculcai usage/year	
domestic water pump #1	Ş	0505070 201/2021							
	8	Spood/9 gal/month	127 ft head	608 gpm	37%	24 kw	\$1 767 ner vear	75 335 burbha	75 335 bubban Dillane Al Trinklatr Tilring
nonnestic water brimb #2	30	alternates with #1	i	1	alternates with #1		and in the	William Cocio	OMING ALIERNAIE, IMEREFORE
					THE COUNTY OF	1		;	JONLY INCLUDE ONE OF TWO PUMPS.
14/-11 #O									
well to water pump	20	9585079 gal/month	527 ft head	244 cnm	010	. 33			
Well #9 water pump	9	bit dim astomethe		IIIda tra	ę in	39 KW	\$2,945 per year	312,518 kwh/yr	312,518 kwh/yr PUMPS ALTERNATE, THEREFORE
	3	aliciliates with #1	1		alternates with #1	1			ONI Y INCLUDE ONE OF TAKE
									SILL MOLDEL CIRE OF 1WO FUMPS.
Sanitary Waste Aration Pump	30	100% oneration							
Sanitary Maste Aration D.		ional operation	1	-	100%	24 kw	\$1.767 per vear	206 367 hwh/vrl	206 367 hwh/which is property of the property
Samualy waste Alation Pump	30	alternates with #1	1		alformation with #4			TOO OF THE PARTY O	TO SOO! NOTIFIED IN STIME THE
Sludge Pump	2	20% operation			ancidates will #	-		I	- TIME - ALTERNATE
Efficient Dump #1	ļ	ionia iado e y:		1	0.20%	4 kw	\$294 per vear	69 kwhhr	
Cindent unip #1	10	33% operation	ı	1	23 0000		, , , , ,	CO Keeling	
Effluent Pump #2	U.	33% operation			92.00 A	O KW	\$589 per year	22,700 kwh/yr	
		SO A OPEI AUDII	1	1	33.00%	3 KW	\$589 ner vear	22 700 kmbb.	
IMHOFF EXHAUST Fan	2	0.6% operation			10000		too bei year	42,100 KWIIYI	
)_					0.60%	2 kw	\$118 per year	83 kwh/vr	
6									

FUTURE

Pump Designation	Pump Horse power	Future water usage	Head presure on pumps	Pump Flow Rate	Pump Flow Rate Average Plimp Heans	Flectrical Kw	Domond Observe	FUTURE	
					office diam to fine	AN IPOINCE	- 1	ciecincai usage/year	
domestic water pump #1	30	996820 gal/month	127 ft head	000					
domestic water numn #2	30	, m , m , m , m , m , m , m , m , m , m		nidi ono	4%	24 kw	\$1,767 per year	7,835 kwh/yr	7,835 kwh/vrllpUMPS ALTERNATE THEREFORE
	3	anemales with #	-		alternates with #1	-			- ONLY INCLUDE ONE OF TWO PLIMPS
domestic water pump #1	30	1072420 gal/month	127 ft head	BOR com	701	24 6	101		
domestic water pump #2 ***	30	alternates with #1		IIIda ooo	9,1	24 KW	\$1,767 per year	8,429 kwh/yr	8,429 kwh/yr/PUMPS ALTERNATE, THEREFORE
		A IIIIA CONTINUE			alternates with #1			1	ONLY INCLUDE ONE OF TWO PUMPS
Moll #8 water sums									
dund long to the	90	996820 gal/month	527 ft head	244 gpm	%6	30 km	€2 045 per upon	14.1100	
Well #9 water pump	09	alternates with #1				W 66	\$2,340 per year	32,5UT KWINYT	32,301 KWINJT PUMPS ALTERNATE, THEREFORE
		the Company	1	1	alternates with #1	1		1	- ONLY INCLUDE ONE OF TWO PLIMPS
									0 100
Sanitary Waste Aration Pump	30	100% oneration							
Sanitary Waste Aration Dumn		Honer and a second	1	1	100%	24 kw	\$1,767 per year	206.367 kwh/vr	206.367 kwh/kriiONF PLIMPS IN OPERATION 100% OF
dillo I lionani oscani di mino	30	alternates with #1	I	1	alternates with #1				THE STATE OF THE PROPERTY OF T
Singge Fumb	co.	.2% operation			1000			1	- IIIME - ALI ERNATE
Effluent Pump #1	C	230/ 000-100		-	0.20%	4 kw	\$294 per year	69 kwh/yr	
Ffillient Dirms #2		33% operation		1	33.00%	8 kw	\$589 per year	22 700 kwhór	
IMMORE Extended	0	33% operation	1	1	33.00%	8 kw	\$589 ner vear	22 700 kushku	
In I Children	2	0.6% operation	1	1	%090	wa C	C118 per year	22,1 00 kmmyr	
						7 V	a i lo per year	63 KWII/yr	
Individual building well pump	j								
dund low Burning on the	6	10% operation	527 ff head	25 gpm	10%	4 kw	\$294 per year	3,439 kwh/vr	3.439 kwh/vri PER PUMP REDINRED

*** option of leaving open valve open at each bidg for freeze protection of pipe (0.25 gpm)









FREEZE PROTECTION BY WATER FLOW

Utilidor Temperature	1.0.1	dwap									
			WILL DO!	WILL DOM, WATER PIPE FREEZE? (WATER FLOWING)	EZE? (WATER	(FLOWING)					
BibE	3did	PIPE	HEATLOSS	HEAT LOSS	WATER	WATER	HEAT	TEMPERATRE	CRITICAL	FLUID	FREEZE?
	SIZE	LENGTH	PER LINEAL	PER LINEAL	FLOW	FLOW	SSOT	DROP	PATH	TENPERATURE	
			FOOT	F007							
			(ASHRAE)	(Adjusted)	•						
			(40F Delta T)							€	
			((btu/hr)/ft)	((btu/hr)/ft)	(gal/min)	(Btu/hr/F)	(Btu/hr)	(F)		38.0	
Bida 606 to Bida 606 Manhole	æ	10#	103.7	95.9	73.5	36,750	959	0.0	1	38.0	Q.
Bidg 606 Manhole to Manhole 3E	6 in	1,300 ft	80.7	74.6	1.5	750	96,973	129.3		38.0	S.
Manhole 3E to Bida 615 hydrant	6 in	100 ft	80.7	74.6	0.5	250	7,459	29.8		38.0	Q.
Manhole 3E to Blda 615	ų. 9	110#	80.7	74.6	1.0	200	8,205	16.4		38.0	Q.
Bida 606 Manhole to Manhole 9	ui 8	220 ft	103.7	95.9	72.0	36,000	21,088	9'0	ļ	37.4	Q2
Manhole 9 to Blda 605	8 ii	280 ft	103.7	94.3	0.5	250	26,414	105.7		37.4	ON N
Manhole 9 to Manhole 12		540 ft	103.7	94.3	71.5	35,750	50,942	1.4	1	36.0	NO
Manhole 12 to Bido 504	1 1/4in	190 ft	21.8	19.1		250	3,620	14.5		36.0	NO
Manhole 12 to Manhole 13	9	120 ft	7.08	70.5	71.0	35,500	8,465	0.2	1	35.7	ON N
Manhole 13 to Bida 503	1 1/4in	130 ft	21.8			250	2,460	8'6		35.7	NO
Manhole 13 to Manhole 13A	e in	40 ft	80.7	70.1	70.5	35,250	2,802	0.1	1	35.6	NO
Manhole 13A to Bido 503	4 in	130 ft	57.0			250	6,418	25.7		35.6	ON
Manhole 134 to Manhole 16	1	350 ਜ	80.7	6.69	70.07	35,000	24,464	0.7	-	34.9	NO
Manhole 16 to Bida 501	2 1/2in	120 ft	38.3	32.5	0.5	250	3,900	15.6		34.9	NO
Manhole 16 to Manhole 63	6 in	640 ft	7.08	68.5	69.5	34,750	43,831	1.3	ţ	33.7	ON
Manhole 63 to Bldg 821 Manhole	9 ii	190 ft	80.7	62.9	35.0	17,500	12,529	0.7	٠	33.7	ON N
Bldg 821 Manhole to Bldg 821	2 in	¥ 09	31.8	26.0	0.5	250	1,559	6.2		33.7	ON
Manhole 63 to Manhole 40	.u. 9	100 ft	80.7	62.9	34.5	17,250	6,594	0.4	1	33.3	NO
Manhole 40 to Bldg 820	2 in	30 ft	31.8	25.7	0.5	250	022	3.1		33.3	ON
Manhole 40 to Manhole 43	.i. 9	360 ft	80.7	65.2	34.0	17,000	23,461	1.4	1	31.9	Q
Manhole 43 to Manhole 65	e e	320 ft	2.08	62.4	21.0	10,500	19,964	1.9		31.9	NO
Manhole 65 to Bldg 725	e.	190 ft	44.6	34.5	8.0	4,000	6,551	1.6		31.9	ON.
Manhole 43 to Manhole 62	9		80.7	62.4	13.0	005'9	14,973	2.3	1	29.6	Q.
Manhole 62 to Bldg 725	2 1/2in	210 ft	38.3	27.4	13.0	6,500	5,755	6.0	_	28.7	9
							400,158				

Required Flow Rate (gpm)	73.5		
Annual Water Consumption (gal)	19,315,800		
Annual Well Pump Electricity (kWh)	781,597	0.0405	0.0405 kWh/gal
Annual Electric Cost (\$)	16,489	0.000854	\$/gal
Annual Chlorination Cost (\$)	8,125	0.000421 \$/gal	\$/gal
Annual Energy Consumption (MBtu)	296		
Annaul Fuel Oil Use (gal)	9,073		
Annaul Fuel Oil Cost (\$)	6,623		

EMC ENGINEERS, INC REPORT.XLS

FREEZE PROTECTION BY WATER FLOW AND HEATING

Utilidor Temperature 1.0 temp

			MILL DC	WILL DOM. WATER PIPE FREEZE? (WATER FLOWING)	EEZE? (WATE)	? FLOWING)					
Pipe	BIPE	PIPE	HEAT LOSS	HEAT LOSS	WATER	WATER	HEAT	TEMPERATRE	CRITICAL	FLUID	FREEZE?
nec	SIZE	LENGTH	PER LINEAL	PER LINEAL	FLOW	FLOW	SSOT	DROP	PATH	TENPERATURE	
			FOOT	FOOT							
			(ASHRAE)	(Adjusted)							
			(40F Delta T)	-						Ð	
			((btu/hr)/ft)	((btu/hr)/ft)	(gal/min)	(Btu/hr/F)	(Btu/hr)	E		0.09	
Bldg 606 to Bldg 606 Manhole	8 in	10 ft	103.7	153.0	31.5	15,750	1,530	0.1	-	59.9	ON ON
Bidg 606 Manhole to Manhole 3E	6 in	1,300 ft	7.08	118.8	1.5	750	154,488	206.0		59.9	ON ON
Manhole 3E to Bldg 615 hydrant	6 in	100 ft	7.08	118.8	9.0	250	11,884	47.5		59.9	ON.
Manhole 3E to Bidg 615	6 in	110 ft	80.7	118.8	1.0	2009	13,072	26.1		59.9	ON N
Bldg 606 Manhole to Manhole 9	ni 8	220 ft	103.7	152.7	30.0	15,000	33,595	2.2	1	57.7	ON
Manhole 9 to Bldg 605	8 in	280 ft	103.7	146.9	6.0	250	41,132	164.5		57.7	ON
Manhole 9 to Manhole 12	8 in	540 ft	103.7	146.9	29.5	14,750	79,326	5.4	-	52.3	ON.
Manhole 12 to Bldg 504	1 1/4in	190 ft	21.8	28.0	0.5	250	5,311	21.2		52.3	Q.
Manhole 12 to Manhole 13	e in	120 ft	80.7	103.5	29.0	14,500	12,416	6.0	-	51.4	ON ON
Manhole 13 to Bldg 503	1 1/4in	130 ft	21.8	27.5	0.5	250	3,573	14.3		51.4	Q.
Manhole 13 to Manhole 13A	6 in	40 ft	80.7	101.7	28.5	14,250	4,070	0.3	-	51.1	Q.
Manhole 13A to Bldg 503	4 in	130 ft	57.0	71.5	0.5	250	9,289	37.2		51.1	ON.
Manhole 13A to Manhole 16	6 in	320 €	80.7	101.2	28.0	14,000	35,407	2.5	-	48.6	ON.
Manhole 16 to Bldg 501	2 1/2in	120 ft	38.3	45.6	0.5	250	5,471	21.9		48.6	ON ON
Manhole 16 to Manhole 63	.E	640 ft	80.7	96.1	27.5	13,750	61,479	4.5	-	44.1	ON ON
Manhole 63 to Bldg 821 Manhole	6 in	190 ft	80.7	0.78	14.0	2,000	16,538	2.4		44.1	ON N
Bldg 821 Manhole to Bldg 821	2 in	90 ft	31.8	34.3	0.5	250	2,058	8.2		44.1	ON
Manhole 63 to Manhole 40	6 in	100 ft	80.7	87.0	13.5	6,750	8,704	1.3	-	42.9	ON
Manhole 40 to Bldg 820	2 in	30 ft	31.8	33.3	9:0	250	866	4.0		42.9	ON N
Manhole 40 to Manhole 43	e ii	360 ft	80.7	84.4	13.0	6,500	30,398	4.7	-	38.2	ON
Manhole 43 to Manhole 65	6 in	320 ft	80.7	75.0	3.0	1,500	24,001	16.0		38.2	ON.
Manhole 65 to Bldg 725	3 in	190 ft	44.6	41.5	3.0	1,500	7,876	5.3		38.2	ON
Manhole 43 to Manhole 62	6 in	240 ft	80.7	75.0	10.0	2,000	18,001	3.6	-	34.6	ON
Manhole 62 to Bldg 725	2 1/2in	210 ft	38.3	32.1	10.0	2,000	6,751	1.4	-	33.2	ON

Required Flow Rate (gpm)	31.5	
Annual Water Consumption (gal)	8,278,200	
Annual Well Pump Electricity (kWh)	334,970	
Annual Electric Cost (\$)	7,067	0.0
Annual Chlorination Cost (\$)	3,482	0.0
Annual Energy Consumption (MBtu)	1,933	
Annaul Fuel Oil Use (gal)	18,146	
Annaul Fuel Oil Cost (\$)	13,247	

334,970 0.000854 \$kgal 3,482 0.000421 \$kgal



FREEZE PROTECTION BY WATER FLOW, HEATING, & PIPE INSULATION

Utilidor Temperature	1.0	1.0 temp										
				WILL DOM. WATE	WILL DOM. WATER PIPE FREEZE? (WATER FLOWING)	ATER FLOWI	NG)					
PIPE	BllE	BIPE	INSULATION	HEAT LOSS	HEAT LOSS	WATER	WATER	HEAT	TEMPERATRE	CRITICAL	FLUID	FREEZE?
LEG	SIZE	LENGTH	THICKNESS	PER LINEAL	PER LINEAL	FLOW	FLOW	SSOT	DROP	PATH	TENPERATURE	
				F00T	F00T							
				(Manville)	(Adjusted)							•
				(70F Delta T)							Œ	
			(in)	((btu/hr)/ft)	((btu/hr)/ft)	(gal/min)	(Btu/hr/F)	(Btu/hr)	(F)		0.09	
Bidg 606 to Bidg 606 Manhole	8 in	10 ft	1.50	22.0	18.5	12.5	6,250	185	0.0	1	0.09	ON
Bidg 606 Manhole to Manhole 3E	6 in	1,300 ft	1.50	21.0	31.0	1.5	750	40,247	53.7		0.09	ON
Manhole 3E to Bldg 615 hydrant	6 in	100 ft	1.50	21.0	31.0	9.0	250	3,096	12.4		0.09	ON.
Manhole 3E to Bldg 615	6 in	110 ft	1.50	21.0	31.0	1.0	200	3,406	6.8		0.09	ON
Bidg 606 Manhole to Manhole 9	8 in	220 ft	1.50	22.0	32.4	11.0	2,500	7,135	1.3	1	28.7	ON
Manhole 9 to Bldg 605	8 in	280 ft	1.50	22.0	31.7	0.5	250	8,882	35.5		283	ON
Manhole 9 to Manhole 12	ni 8	540 ft	1.50	22.0	31.7	10.5	5,250	17,129	3.3	1	55.4	NO
Manhole 12 to Bldg 504	1 1/4in	190 ft	1.00	11.0	15.0	0.5	250	2,843	11.4		55.4	NO
Manhole 12 to Manhole 13	6 in	120 ft	1.50	21.0	28.6	10.0	2,000	3,428	2.0	1	54.7	NO
Manhole 13 to Bldg 503	1 1/4in	130 ft	1.00	11.0	14.8	0.5	250	1,921	7.7		24.7	ON
Manhole 13 to Manhole 13A	6 in	40 ft	1.50	21.0	28.2	9.5	4,750	1,128	0.2	1	54.5	NO
Manhole 13A to Bldg 503	4 in	130 ft	1.50	16.0	21.4	0.5	250	2,781	11.1		54.5	NO
Manhole 13A to Manhole 16	6 in	350 ft	1.50	21.0	28.1	0.6	4,500	9,828	2.2	-	52.3	ON ON
Manhole 16 to Bldg 501	2 1/2in	120 ft	1.50	13.0	16.7	0.5	250	2,001	8.0	•	52.3	ON NO
Manhole 16 to Manhole 63	ui 9	640 ft	1.50	21.0	26.9	8.5	4,250	17,238	4.1	1	48.2	ON
Manhole 63 to Bldg 821 Manhole	ui 9	190 ft	1.50	21.0	24.8	4.5	2,250	4,713	2.1		48.2	ON
Bldg 821 Manhole to Bldg 821	2 in	11 09	1.50	10.01	11.8	0.5	250	209	2.8		48.2	ON
Manhole 63 to Manhole 40	6 in	100 ft	1.50	21.0	24.8	4.0	2,000	2,480	1.2	1	47.0	NO
Manhole 40 to Bldg 820	2 in	30 ft	1.50	10.0	11.5	0.5	250	345	1.4		47.0	NO
Manhole 40 to Manhole 43	u 9	360 ft	1.50	21.0	24.2	3.5	1,750	8,695	5.0	1	45.0	NO
Manhole 43 to Manhole 65	6 in	320 ft	1.50	21.0	21.5	1.5	750	6,894	9.5		45.0	NO
Manhole 65 to Bldg 725	ui E	190 ft	1.50	13.0	13.3	1.5	750	2,534	3.4		45.0	NO
Manhole 43 to Manhole 62	ս։ 9	240 ft	1.50	21.0	21.5	2.0	1,000	5,171	5.2	1	36.9	NO
Manhole 62 to Bldg 725	2 1/2in	210 ft	1.50	13.0	11.7	2.0	1,000	2,448	2.4	1	34.4	ON

Required Flow Rate (gpm)	12.5		
Annual Water Consumption (gal)	3,285,000		
Annual Well Pump Electricity (kWh)	132,925	0.0405	0.0405 kWh/gal
Annual Electric Cost (\$)	2,804	0.000854	\$/gal
Annual Chlorination Cost (\$)	1,382	0.000421	\$/gal
Annual Energy Consumption (MBtu)	191		
Annaul Fuel Oil Use (gal)	7,201		
Annaul Fuel Oil Cost (\$)	5,257		

40,878 CY

EXCAVATION REQUIREMENTS FOR LEACH FIELD

			TOTAL	GRAVEL	SAND	SELECT
BLDG	DESCRIPTION	LEACH FIELD LENGTH	EXCAVATION	BACKFILL	BACKFILL	BACKFILL
501	POST HQ	900 FT	55,440 FT^3		2,700 FT^3	
503	GYMNASIUM	2,400 FT	147,840 FT^3	4,800 FT^3		
504	FIRE STATION	450 FT	27,720 FT^3	900 FT^3		
605	CONSOLIDATED PW	900 FT	55,440 FT^3	1,800 FT^3	2,700 FT^3	
606	CENTRAL HEATING PLAN	450 FT	27,720 FT^3	900 FT^3		
612	TANK MAINTENANCE	1,800 FT	110,880 FT^3	3,600 FT^3		
615	ROADS AND GROUNDS	1,800 FT	110,880 FT^3	3,600 FT^3	5,400 FT^3	101,880 FT^3
658	TEMP MOTOR POOL	2,400 FT	147,840 FT^3	4,800 FT^3	7,200 FT^3	135,840 FT^3
725	SCHOOL	2,400 FT	147,840 FT^3	4,800 FT^3	7,200 FT^3	135,840 FT^3
820	HOUSING UNIT	3,000 FT	184,800 FT^3			
821	HOUSING UNIT	3,000 FT	184,800 FT^3	6,000 FT^3	9,000 FT^3	169,800 FT^3
633	SEWAGE TREATMENT	N/A	N/A	N/A	N/A	N/A
	Total (FT^3)	19,500 FT	1,201,200 FT^3	39,000 FT^3	58,500 FT^3	1,103,700 FT^3

Total (CY) 44,489 CY 1,444 CY 2,167 CY

TOTAL EXCAVATION = LEACH FIELD LENGTH * (56 FT^2) * (1.1)

(1.1 = 10% FOR MISC.)

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Approach taken to achieve a calculatable flow rate for Danidary Sewer and domestic water for bldg's at Fort Greely. * Sonitary Sewer

- Where possible, for servage, use U.P.C. Table I-3, page 260-261, for estimated waste flow rates for various 616gs (Private servage disposal systems).

offices - 20 gol/day/employee schools - 28 gol/day/student

god station - 1000 god/day/god bay Bowling alley - 75 god/day/lone

Barracks/ - 60gal/day/bed Housing

stores - 20 gal/day/employee

Laundry - 50 gol/day/wash

Cafeteria - 10 gal/day/person Ch. 1d Care - 15 gul/day/person

Church - 5 gel/day/person

Mainterance - 1 gal/s.F./day

at 80 s.F./person

at 205. E./ person

at 2 bays

at 10 lanes

at 100 s. F/bed

at 200 S.F./employee

at (usume 12 washing machines with wash cycles every he for 8 hours)

at 20 s.F./puron

at 30 s.F./puron

at 15 S.F./person

(assuming 1 Water closed, 1 LAV
per 10005. F.)
(= 30 flusher/out at 7 gal/flush
= 3 c.p. for law at 2 ha/duy
= 550 gal/day miss.)

office/maintenance - 20 gal/say engioyee at 160 5.7/person Warehouse - 0.25 gal/S.F./day

Fire Station - 20 gal/day/ fire man at 120 E.F./ persons

25. F./ person from Ashive Pochet Golde page 28-129, 10930

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Continued: Flow rate for sanitary Sever and conectic water

* domestic water

- From meter readings at the school, water use ≈ 30% greater than waster use

From meter readings for the overall site, water use 2 4/0 % greats than waste use.

The values from the sanitary wasterstimate increased by 35% for the water use.

Electrical Urages at Sewage Lagoon
1) 5 lu dge pump, operatur 1/2 hr every 10-14 day (5 Hp) ~ 18 hrs every year ~ 0.2%
2) effluent pumps, operators 6-8 hrs/day (2@10HP) = 2920 hrs every year each
3) IMHoff Exhaust Fan, operatus 1 hr/week (2Hp) ~ 52 hrs every year
4) Aerator blowers, operative continuously (only one) (2030 Hp) = 8760 hrs every year

TABLE I-2

Capacity of Septic Tanks*

				€	<u> </u>	<u>ন</u>	~	<u> </u>	<u>~</u>	≅	€	· (C)	_	€
Minimum	Septic Tank	Capacity in	(liters)	(2838)	(3785)	(4542	(2678)	(757)	(8516	(9463)	(10,409)	(11,355	(12,301)	(13,248)
Mini	Septic	Capa	Gallons	750	1000	1200	1500	2000	2250	2500	2750	3000	3250	3200
Other Uses:	Maximum Fixture	Units Served	per Table 7-3	15	20	22	33	45	22	9	20	8	6	100
Multiple Dwelling	Units or	Apartments - One	Bedroom Each			2 units	က	4	വ	ဖ	7	œ	6	10
Single Family	Dwellings –	Number	of Bedrooms	1 or 2	က	4	5 or 6							

Extra bedroom, 150 gallons (568 liters) each.

Extra dwelling units over 10, 250 gallons (946 liters) each.

Extra fixture units over 100, 25 gallons (95 liters) per fixture unit.

*Note: Septic tank sizes in this table include sludge storage capacity and the connection of domestic food waste disposal units without further volume increase.

TABLE 1-3

Estimated Waste/Sewage Flow Rates

Because of the many variables encountered, it is not possible to set absolute values for waste/sewage flow rates for all situations. The designer should evaluate each situation and, if figures in this table need modification, they should be made with the concurrence of the Administrative Authority.

7	Type of Occupancy Gallo	Gallons (liters) Per Day
-:	1. Airports	56.8) per employee 18.9) per passenger
ત્યં	2. Auto washersCheck with equipment manufacturer	ment manufacturer
က်	Bowling alleys (snack bar only)75 (283.9) per lane	.75 (283.9) per lane
4	Camps:	
	Campground with central	
	comfort station35 (132.5) per person	(132.5) per person
	with flush toilets, no showers	5 (94.6) per person
	Day camps (no meals served)15 (56.8) per person	5 (56.8) per person
	Summer and seasonal50 (189.3) per person	(189.3) per person
က်	Churches (Sanctuary)	5 (18.9) per seat7 (26.5) per seat

PRIVATE SEWAGE DISPOSAL SYSTEMS

Table I-3

Type of Occupancy	Gallons (liters) Per Day
6. Dance halls	
7. Factories	
No showers	No showers25 (94.6) per employee
with showers Cafeteria, add	With showers
8. Hospitals	55(C) (C) (C) (C) (C) (C) (C) (C) (C) (C)
Kitchen wa	Kitchen waste only25 (94.6) per bed
Laundry waste only	Laundry waste only
Hote	60 (227.1) per bed (2 person)
10. Institutions (Resident)	75 (283.9) per person
Nursing home	Nursing home125 (473.1) per person
	Rest home125 (473.1) per person
11. Laundries, self-service	
Commercial To fronts per day)Per manufacturer's specifications	50 (189.3) per wash cycle Per manufacturer's specifications
12. Motel	50 (189.3) nor had space
with	60 (227.1) per bed space
13. Offices 20 (75.7) per employee	-
14. Parks, mobile homes	250 (946 3) ner snace
picnic parks (tollets only)20 (75.7) per parking space	20 (75.7) per parking space
recreational vehicles -	
without water hook-up	75 (283.9) per space
with water and sewer hook-up	with water and sewer hook-up100 (378.5) per space
15. Restaurants – cafeterias	20 (75.7) per employee
toilet	7 (26.5) per customer
Kitchen Waste	6 (22.7) per meal
add for cockall founds	1 (3.8) per meal
kitchen waste –	
disposable service2 (7.6) per meal	2 (7.6) per meal
16. Schools - Staff and office	20 (75.7) per person
Elementary students15 (56.8) per person	15 (56.8) per person
Intermediate and high20 (75.7) per student	20 (75.7) per student
with gofotods add	
Boarding, total waste	will calciella, and
17. Service station toilets	1000 (3785) for 12t hou
	(1892.5) for each additional bay
18. Stores	20 (75.7) per employee
	10 sq. ft. (4.1/m²) of floor space
SWİ	10 (37.9) per person
20. Theaters, auditoriums5 (18.9) per seat drive-in	5 (18.9) per seat
······································	

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Calculation of Electrical usage/yn for pump motors

attemed \$ \$08,100,9 = gases interes gait of \$100, 1 # going retor interest head on pump=55pi=127 the head, motor 7 = 9570, pump 7 = 65%

Pump flow note = Hp * 3960 * Mano = 608 gpm

Average pump was = $\frac{9001803 \frac{94 \text{mostle}}{1 \text{ yr}}}{6089 \text{ pm} \left(\frac{60 \text{ min}}{1 \text{ min}}\right) \left(\frac{34 \text{ mostle}}{1 \text{ day}}\right) \left(\frac{365 \text{ das}}{1 \text{ yr}}\right)}$

= 33.8%

Electrical KW = 0.746 * Hp = 23.6 KW

Electrical Usage pur year (KWH)

23.6KW * 24 Wday * 365 day year * 33.8% = 69877 KWH/yr

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Durpose: Estimate the electrical power usage from the existing and future domestic water systems.

Known: The existing domestic water system is comprised of two-50HP pumps, pressurizing two-20,000 gal storage tanks. Existing water usage = 9,990,105 ga/month (on average) Future water usage = 1,527,580 ga/month (calculated)

- determines flow rate of pumps: Hp = Ft-head & gpm 3960 * 7 pump

assume - pressuring took to 80 psi - effective of pump = 65%

3Pm = Hp* 3960 * 7pmp = 504p * 3960 * 0.65 ++ head (80ps? * 2.31 Films)

= 696 gpm = 700 spm = 30,240,000 gulmate

existing usage = 9,990,105 50/month = 0.33 or 33%

- Connect Ap of HW: (assuming a 95% efficient motor)

KW= 0.746 + HP = 39.3 kW

- Existing power usage = 39.3KW * 24 Mday * 365 dayly * 0.33 = 113,608 KWH

- Future power usage = Future waterusage = 1,527,580 selfratt = 0.15 on 15%

:. Future power usage = Existing power wage * 0.15 = 17,040 KWH)

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JOB 1406.003	
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SCALE	

Requirements For Fire Protection systems:

- i) Existing bldgs to remain do not have sprinkler systemon . within mettyes agisphate
 - assume block to have occupancy Classification of Oratinary Hazard, Therefore Hose flow required to be 1,000 gpms for a 90 minute duration.

Fire protection Storage tank minimum size = 1000 gpm * 90 min = 90,000 gal PHIVALE SEWAGE DISPOSAL STOLEINIS

& Septic Tanks

gauge (0.109) (2.8 mm) and each such tank shall be protected from corrosion, both externally and internally, by an approved bituminous The minimum wall thickness of any steel septic tank shall be No. 12 U.S. coating or by other acceptable means.

(3) Alternate Materials

- (i) Septic tanks constructed of alternate materials may be approved by the Administrative Authority when complying with approved applicable standards.
- (ii) Wooden septic tanks are prohibited.

(n) Prefabricated Septic Tanks

- approved applicable standards and be approved by the Administrative (1) Manufactured or prefabricated septic tanks shall comply with all Authority.
- (2) independent laboratory tests and engineering calculations certifying the tank capacity and structural stability shall be provided as required by the Administrative Authority.

16 Disposal Fields

- Other approved materials, provided that sufficient openings are available for (a) Distribution lines shall be constructed of clay tile laid with open joints, perforated clay pipe, perforated bituminous fiber pipe, perforated high density polyethylene pipe, perforated ABS pipe perforated PVC pipe or distribution of the effluent into the trench area.
- smeared or compacted surfaces shall be removed from trenches by raking to gravel, slag, or similar filter material acceptable to the Administrative Authority, varying in size from three fourths (3/4) inch to two and one-half a depth of one (1) inch (25 mm) and the loose material removed. Clean stone, (2-1/2) inches (19 mm to 64 mm) shall be placed in the trench to the depth and grade required by this section. Drain pipe shall be placed on filter material in an approved manner. The drain lines shall then be covered with filter material to the minimum depth required by this section and this covered with untreated building paper, straw, or similar porous material to (b) Before placing filter material or drain lines in a prepared excavation, all prevent closure of voids with earth backfill. No earth backfill shall be placed over the filter material cover until after inspection and acceptance.

in lieu of pipe and filter material. Chamber installations shall follow the rules for disposal fields, where applicable, and shall conform to Exception: Listed or approved plastic leaching chambers may be used manufacturer's installation instructions.

- A grade board staked in the trench to the depth of filter material shall be utilized when distribution line is constructed with drain tile or a flexible pipe material which will not maintain alignment without continuous support.
- (d) When seepage pits are used in combination with disposal fields, the

m) from the pit excavation and the line extending from such points to the seepage pit filter material in the trenches shall terminate at least five (5) feet shall be approved pipe with watertight joints.

distribution box of sufficient size to receive lateral lines shall be installed at the head of each disposal field. The inverts of all outlets shall be level and the invert of the inlet shall be at least one (1) inch (25.4 mm) above the outlets. Distribution boxes shall be designed to insure equal flow and shall (e) Where two (2) or more drain lines are installed, an approved be installed on a level concrete slab in natural or compacted soil.

Distribution boxes shall be coated on the inside with a bituminous coating or other approved method acceptable to the Administrative Authority.

- approved pipe with watertight joints. Multiple disposal field laterals, (f) All laterals from a distribution box to the disposal field shall be wherever practicable, shall be of uniform length.
- with approved pipe with watertight joints on natural ground or compacted (g) Connections between a septic tank and a distribution box shall be laid
- shall have a capacity equal to sixty (60) to seventy-five (75) percent of the interior capacity of the pipe to be dosed at one time. Where the total length shall be provided with two (2) siphons or pumps dosing alternately and in five hundred (500) lineal feet (152.4 m) of leach line, a dosing tank shall be used. Dosing tanks shall be equipped with an automatic siphon or pump which discharges the tank once every three (3) or four (4) hours. The tank of pipe exceeds one thousand (1000) lineal feet (304.8 m), the dosing tank (h) When the quantity of sewage exceeds the amount that can be disposed each serving one-half (1/2) of the leach field.
- (i) Disposal fields shall be constructed as follows:

	Minimum	Maximum
Number of drain lines per field Length of each line	– 1	(100 ft.)(30.5 m)
Bottom width of trench	(18 in. (0.5 m)	36 in. (0.9 m)
Spacing of lines, center-to-center	6 ft. (1.8 m)	t
Depth of earth cover of lines [preferred -18 in (457.2 mm)]	12 in. (0.3 m)	ı
Grade of lines	level	3 in./100 ft. (25 mm/m)
Filter material under drain lines	12 in. (0.3 m)	ı
Filter material over drain lines	2 in. (50.8 mm)	ı

drain lines in leaching beds shall not be more than six (6) feet (1.8 m) apart on centers and no part of the perimeter of the leaching bed shall be more trenches and leaching beds shall not be paved over or covered by concrete (1.2 m) plus two (2) feet (0.6 m) for each additional foot (0.3 m) of depth in excess of one (1) foot (0.3 m) below the bottom of the drain line. Distribution than three (3) feet (0.9 m) from a distribution drain line. Disposal fields, Minimum spacing between trenches or leaching beds shall be four (4) feet

994 UNIFORM PLUN. JG CODE (a) Recommended Design Criteria. Sewage disposal systems sized using the estimated waste/sewage flow rates should be calculated as follows: capacity in gals./sq. ft. Maximum absorption a 24 hr. period (L/m^2) of leaching area for (203.7)(162.9)(101.8)(44.8) (32.6)Secondary system shall be sized for total flow per 24 hours. (1) Waste/sewage flow, up to 1500 gallons/day (5677.5 L/day) Waste/sewage flow, over 1500 gallons/day (5877.5 L/day) (28,387.5) (18,925.0) 2.0 5.0 5.0 13,247.5) 0.8 (11,355.0)Maximum Septic Tank Ξ (Ilters) Size Allowable Design Criteria of Five Typical Soils of leaching area/ Required sq. ft. 100 gals. (m²/L) Gallons (0.005) (0.006) (0.022)(0.010) (0.030)7500 5000 3500 3000 Flow x 0.75 + 1125 = septic tank size TABLE 1-4 ABLE 1-5 (b) Also see Section I 2 of this appendix. 22 8 8 9 8 Flow x 1.5 = septic tank size (0.005-0.006)Clay with small amount of sand Leaching Area/100 gals Required Square Feet of (0.010) (0.022) (0.030) (m^2/L) Clay with considerable sand Septic Tank Capacity Sandy loam or sandy clay Coarse sand or gravel Tables I-4 and I-5. 20-25 5 8 2 8 8 8 **Type of Soil** or gravel Fine sand or gravel <u>N</u> ල

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TABLE II

SEPTIC TANK MINIMUM LIQUID CAPACITY

- A. Determine the applicable wastewater useage rate (Q) in TABLE III of these Standards.
- B. Calculate the minimum septic tank volume (V) as follows:
 - For Q equal to or less than 250 gal/day:

V = 750 gallons

2. For Q greater than 250 gal/day but less than 351 gal/day:

V = 1000 gallons

For Q greater than 351 gal/day but less than 501 gal/day:

V = 1250 gallons

4. For Q greater than 501 gal/day but less than 1501 gal/day:

V = 2.5 Q

5. For Q greater than 1501 gal/day:

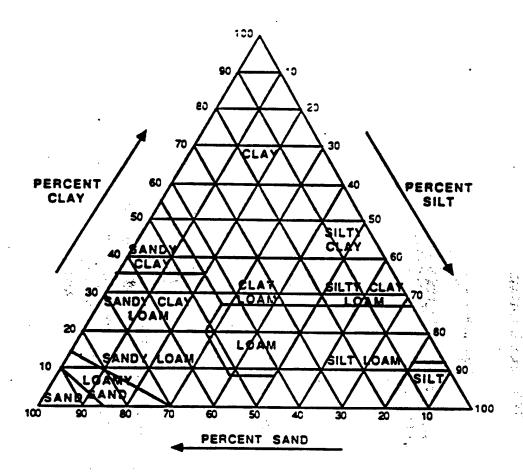
V = 1,875 + 0.75 Q

NOTES: The inside liquid depth of the tank shall not be less than 30 inches.

Tank sizing in B (1)(2)(3) correspond to two, three and four bedroom single family dwellings.

TABLE VIII

USDA SOIL TEXTURAL CLASSIFICATIONS



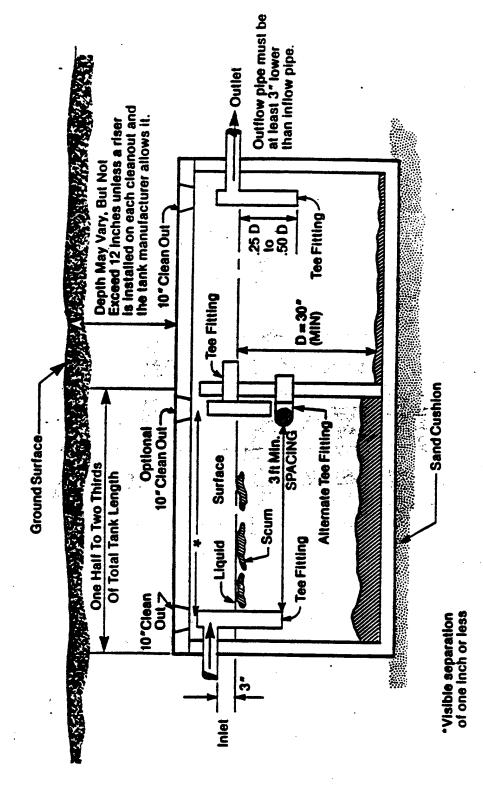
Clay - Smaller than 0.002 millimeters in diameter

Silt — 0.05 to 0.002 millimeters in diameter

Sand -2.0 to 0.05 millimeters in diameter

(Sand shall be free of organic matter and shall be composed of silica, quartz, mica or any other stable mineral).

TWO COMPARTMENT SEPTIC TANK



Not intended to serve as an engineered design for construction purposes

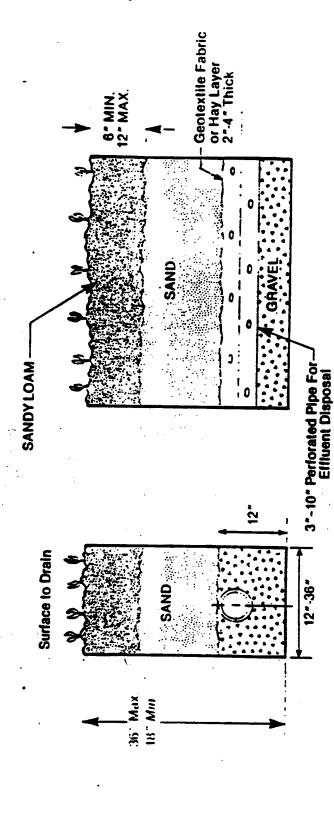
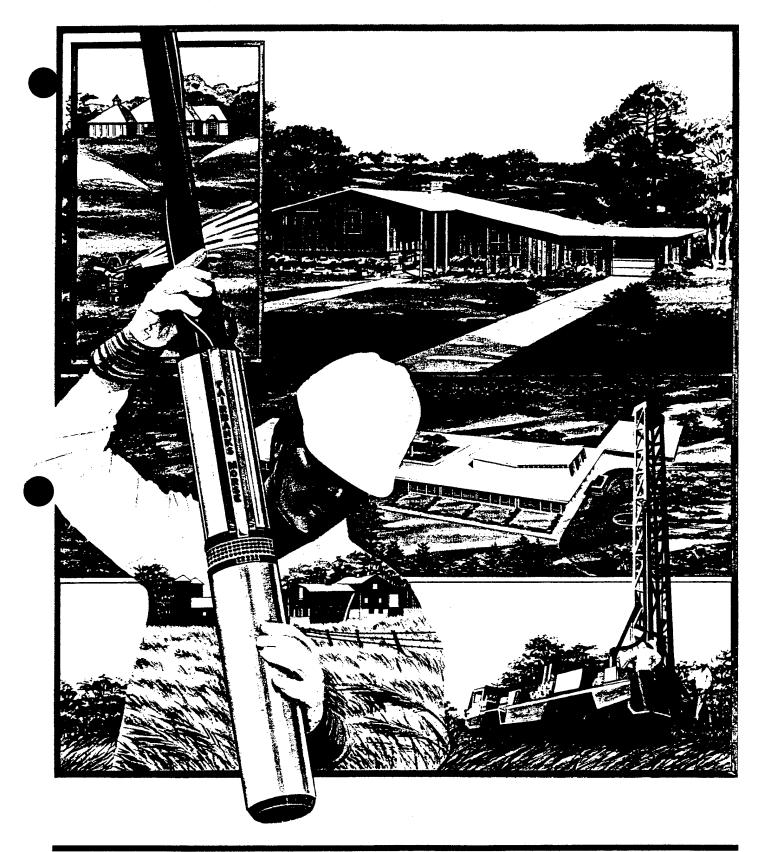


FIGURE 3 SOIL ABSORPTION TRENCH

Not intended to serve as an engineered design for construction purposes.

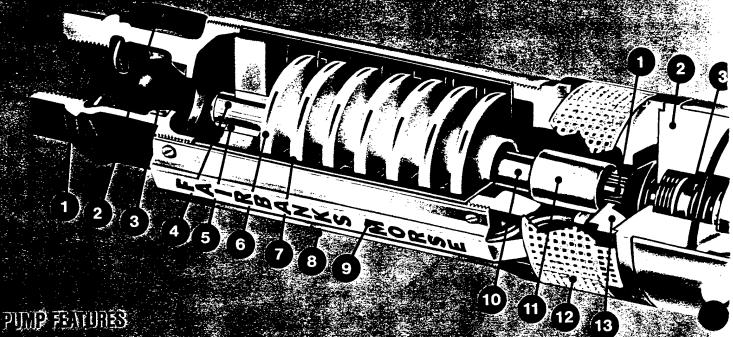


Fairbanks Morse

Domestic Submersibles

ralidanks Morso has an dalablished also tory of plougation accepted for ingreased. Sorve the needs of social type it in the contract of the provision of the contract

ON CONTRACTOR OF CHILD PERSONS STRIVENCE SORVE THE REALS OF SOCIOUS BY AS IT HOWE HID alijon has continued with each generation. commitments, to be the bestentime motor builders in the world



- TEXTOS CHARGE HEAD.

 Lippe Trapeling signate allows ristaliation case. Over hassage read (each rists a pictor assess rumally associated with 2 febre read (each) consultations.
- APETY NOPEHANDLE arge opening provides the the well pump unit security
- BUTE IN CHECK VALVE ntinite sealing surfaces of precision ground neoprene ball and angular Contact bronze seat give the ultimate in proven dependability. Stainless steel retainer and non-mechanical design assure trouble-free service.
- SPLINED STAINLESS STEEL SHAFT Splines insure maximum drive contact within impeller hubs.
- 5 UPPER SHAFT BEARING The stainless steel journal and the bronze bearing are part of a replaceable cartridge assembly (items 4-5-6-7-10-11) insuring proper alignment of the rotating components. Bearing spider design provides solid shaft support.
- 6 IMPELLERS Celcon® construction provides inherent lubrication and ultra smooth finish for maximum flow and abrasive resistance. Extra heavy hubs provide exceptional strength at the shaft. Pregistered trademark-Celanese Plastics Co.
- **DIFFUSER CASES** Rugged Noryl® construction offers excellent abrasive resistance, high strength and built-in lubricity for maintaining "new pump" efficiency. Designed for optimum performance. *Registered trademark - General Electric Co.

- 8 POLISHED STAINLESS STEEL BODY
 - Heavy wall type 304 stainless steel gives maximum protection against corrosive well conditions.
- STAINLESS STEEL LEAD GUARD Heavy duty construction protects motor leads from installation damage.
- THRUST BUSHING Stainless steel construction provides maximum strength.
- SPLINED STAINLESS STEEL COUPLING O NEMA shaft coupling is pinned to pump shaft for precise fit and alignment. Design allows simplest pump-to-motor assembly available.
- **CORROSION PROOF SUCTION SCREEN** Special material provides maximum inlet flow by retarding water scale build-up.
- **NEMA FLANGE MOUNTING BRACKET** Standard mounting dimensions allow installation of any NEMA submersible motor. Large open design reduces suction restriction.

STAINLESS STEEL HARDWARE All screws, nuts and washers are stainless steel, giving secure attachment of component parts.

TESTING Every pump unit component goes through numerous inspections and tests prior to final assembly. Each pump unit assembly is water tested under multiple conditions simulating actual field applications as to pump performance and electrical power variations.

HOTOR HARDRES

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7.8

- TEMA ELAMBET (1908) CARITER Ensury subspectful digital receiver the MA statistics Englishing subspective Consum takes all gighy inner looks. Our modul parts are not the English in class from Englishments procession restrict their go
- akensineimi aimitaiss inid maisier earinle aideale om componente are lapoco e polímicio, collegado do disputa de Acque d
 - THRUST BEARING. Ball constituction originales succentration, decise alignment and rule e operations superciliaeserve provides comment flucteations.

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FPHP SBVIRE (* 1741/) HPP 2-WIRE SBUTES TOOLINUUT HOOF DIVECTO BOOT WELCHET FOLIOGE

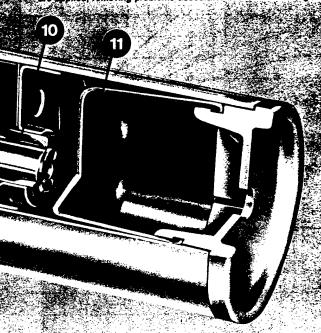
Control of rotor ambased specifical balance.

POLISHED STAINLESS STEEL BODY 4. Heavy wall by pe 304 stainless steel construction for maximum motor protection in corrosive well conditions.

STATOR WINDINGS Automatic winding equipment eliminates human error, giving each motor exacting performance. Heavily insulated copper wire combined with additional insulation and baking processes give high strength surge protection Oil surrounding the stator guarantees superb heat transfer and insulation qualities

BRONZE GUIDE BEARING

Motor shaft is centered by this oil lubricated bearing. No thrust loads are applied, removing problems associated with lower bearing carriers.



PRESSURE EQUALIZATION DIAPHRAGM

Flexible diaphragm balances pressure internally thereby bliminating differential pressure across rotating seal between oil and well water. Regardless of submemence depth or motor temperature, no fluid transfer

OIL LUBRICATION AND COOLING

Highly refined dielectric mineral oil is approved for submersible motor application. Automatic vacuum process equipment insures complete oilfill and eliminates air entrapment. Internal parts are not subject to corrosion or water scaling. Advanced design of oil-filled motor offers excellent insulation, superb heat transfer, elimination of hot spots and contaminant-free bearing lubrication.

TESTING

Every Fairbanks Morse submersible motor must meet high manufacturing acceptance levels. The latest in advanced electronic test equipment assures the highest quality submersible motors available.

Test stations placed at intermediate stages of assembly monitor the complete manufacturing process. High voltage surge test equipment automatically performs multiple stator integrity checks. Insulation of main and start windings must pass tests at progressive stages of assembly.

Performance testing of horsepower, speed, torque, amps, watts, volts and winding resistance is done after final assembly in addition to tests of rotation, vibration, noise and motor frame straightness.

MOTOR AND CONTROL TYPES

TWO-WIRE, 230 VOLT, SINGLE PHASE

BUILT-IN START AND RUN CAPACITOR
Oil-filled, over-sized, 370 volt permanent split capacitor design eliminates troublesome in-the-motor switches associated with other two-wire units. Interchangeable leads that cannot be confused and no control box to install provide installation ease. Electrically efficient two-wire units have high running torque and proven in-the-well reliability.

THREE-WIRE, 115/230 VOLT, SINGLE PHASE—ABOVE GROUND CONTROL BOX

Large box terminal for each wire assures easy installation and inspection. A removable circuit board and accessible components facilitate service. Conveniently located conduit knockouts and easy-to-read wiring diagram further simplify installation. 11/2 HP and larger boxes include manual reset overload protection. Reset button is accessible without removing box cover. High torque three-wire motors offer time tested dependability where tough well conditions

THREE PHASE, 230/460 VOLT-ABOVE GROUND MAGNETIC STARTER

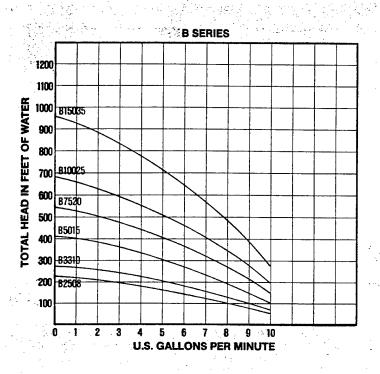
Magnetic, three phase, non-reversing starters with ambient compensated quick trip overloads across each line are required for motor protection. Three phase submersible motors are high-torque, high-efficiency units for use where three phase power is available.

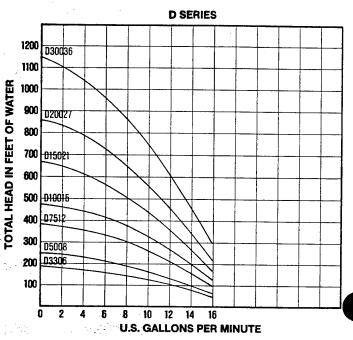


Fairbanks Morse

Pump Division

PUMP UNITS ARE TESTED AND RATED IN ACCORDANCE WITH WATER SYSTEM COUNCIL STANDARDS





F SERIES 1200 F50035 1100 **FOTAL HEAD IN FEET OF WATER** 1000 900 800 F30023 700 600 F20017 500 F15013 400 300 F7507 200 F5005 100 10 12 14 16 18 U.S. GALLONS PER MINUTE

FAIRBANKS MORSE 4" DOMESTIC SUBMERSIBLE PUMP

NOMINAL CAPACITY

B SERIES 5 GPM D SERIES 10 GPM F SERIES 18 GPM

ORDERING INFORMATION

MODEL EXPLANATION
EITHER TWO OR THREE NUMBERS
FOR MOTOR H.P. (1/4 THRU 5 H.P.)

2 B 2 5 0 8 + PHASE + VOLTAGE

PUMP SERIES

LAST TWO NUMBERS
EQUAL PUMP STAGES

Selection Charts 3 & 5 H.P.

3	HP				D	30	03	6
	PM		TANK	PRES	SURE	(PSI)		SHUT- OFF
36 \$1	AGES	8	20	30	40	50	60	(PSI)
	20					1059	1045	486
	40					1047	1033	477
	60				1049	1035	1021	468
	8			1050	1037	1023	1009	460
	100		1052	1039	1025	1011	996	451
	120		1040	1027	1013	998	984	442
	140	1056	1028	1014	1000	986	971	434
	160	1044	1016	1002	968	973	958	425
	180	1032	1004	990	975	960	946	416
	200	1020	991	977	962	947	932	408
	220	1007	979	964	950	934	919	39 9
	240	995	966	951	936	921	906	390
	260	963	953	938	923	908	892	38 2
	280	970	940	925	910	894	878	3 73
Ė	300	957	927	912	896	880	864	364
₩.	340	931	900	885	868	852	836	347
=	390	904	873	857	840	823	806	330
Ħ	420	877	844	828	811	794	776	313
*	460	849	815	798	781	763	745	295
DEPTH TO WATER IN FEET	500	820	785	768	750	731	712	278
E	540	790	754	736	717	698	678	261
5	580	759	722	703	684	664	643	243
	620	727	689	669	648	628	606	226
	660	694	654	633	612	590	568	209
	700	659	618	596	573	550	526	191
	740	623	579	556	533	508	483	174
	780	585	539	515	490	463	436	157
	820	545	496	470	443	415	385	139
	860	503	450	422	393	361	328	122
	900	457	400	370	337	302	264	105
	940	408	346	311	274	233	187	87
	980	354	284	244	200	149	87	70
	1020	294	212	163	104		1	53
1	1060	224	121		T^-	1	\top	35
l	1100	136		\Box				18
	TOT	AL SH	UT- O FI	HEAD	1141	FEET	(494	PSI)

3	HP				F	30	02	23
18	GPM		TANE	PRES	SURE	(PSI)		SHUT
23 8	TAGES	8	20	30	40	50	60	OFF (PSI)
	20					1539	1510	301
	4				1542	1515	1486	29 2
	60			1545	1518	1491	1448	28 3
	80		1548	1521	1494	1467	1434	275
	100		1527	1497	1470	1437	1411	266
	120	1554	1503	1473	1443	1413	1384	258
	140	1533	1479	1446	1419	1401	1355	249
	160	1509	1449	1422	1392	1359	1326	240
:	180	1485	1425	1395	1365	1332	1296	232
33	200	1458	1401	1371	1335	1302	1266	223
DEPTH TO WATER IN FEET	220	1431	1374	1341	1305	1272	1236	214
E	240	1407	1347	1311	1275	1242	1205	206
¥	260	1383	1317	1281	1245	1212	1171	197
2	280	1353	1287	1251	1215	1179	1138	188
E	300	1323	1257	1221	1182	1143	1098	180
8	340	1263	1194	1155	1113	1065	1018	162
1	380	1203	1125	1077	1032	978	922	145
ŀ	420	1134	1044	993	939	882	814	128
1	460	1056	951	894	834	765	682	110
1	500	966	852	783	708	624	52 5	93
	540	870	729	645	552	444	306	76
	580	750	579	477	354	204		58
	620	603	390	246				41
	660	420	96					24
	TOT	AL SH	UT-OF	F HEA	730	FEET (316 P	SI)

5	HP				F	50	03	5
18 (PM		TANI	PRES	SURE	(PSI)		SHUT-
3 5 S1	AGES	0	20	30	40	50	80	OFF (PSI)
	20						1571	465
	40					1572	1555	457
	60				1575	1560	1541	448
	80			1578	1560	1545	1528	439
	100		1581	1563	1548	1530	1510	431
	120		1566	1548	1530	1512	1494	422
	140	1584	1551	1533	1515	1497	1479	413
	160	1569	1536	1518	1500	1482	1462	405
	180	1554	1521	1503	1479	1464	1445	396
	200	1539	1506	1485	1467	1449	1428	387
	220	1527	1488	1470	1452	1431	1411	379
	240	1509	1473	1455	1434	1413	1393	370
	260	1494	1455	1437	1416	1398	1375	361
Ł	280	1479	1440	1419	1401	1377	1357	353
	300	1461	1422	1401	1380	1362	1338	344
=	340	1425	1386	1365	1344	1323	1300	327
TO WATER IN FEET*	380	1392	1350	1329	1306	1284	1260	310
¥	420	1356	1314	1290	1266	1242	1216	292
2	460	1317	1272	1248	1224	1197	1171	275
DEPTH	500	1278	1230	1206	1179	1155	1127	258
	540	1239	1185	1161	1137	1110	1076	240
	580	1191	1143	1116	1086	1056	1026	223
	620	1149	1092	1065	1035	1002	966	206
	660	1101	1044	1011	978	942	905	188
	700	1050	984	951	915	879	834	171
	740	993	924	888	849	804	751	154
	780	933	861	816	768	717	662	136
	820	870	783	732	678	621	558	119
	860	795	693	639	576	510	432	102
	900	708	594	528	453	375	276	84
	940	606	474	396	303	207	84	67
	980	492	330	237	129			50
	1020	357	156	-	 			32
	1060	186	1.50	 	I		—	15
		1	JT-OF	HEAD	1120	FEET	(484 f	'SI)

*Ratings are in Gallons Per Hour

Friction losses in discharge pipe and fittings are not included in these tables.

SUBMERSIBLE WIRE SELECTION CHARTS

Maximum Longth DROP CABLE in Feet— Motor to Control Box or Starter						C	Max entrel B	imum S ox or S						er					
	_				Win	Size (copper	1						Wi	re Size	Icebb	er		
	Velts	N.P.	#14	#12	#10	#8	#6	#4	#2	#0	H.P.	#14	#12	#10	#8	#6	#4	#2	#0
_	П	14	115	175	280						4/4	30	45	70	115	175	285	45 5	
ĺ	2	1/3	110	165	260	371			- 1		1/3	25	40	65	105	165	260	415	
	1	4,	80	130	195	310	471				1/2	28	30	60	80	125	200	315	500
•	Г	14	450	705							14	115	175	280	460	720			
Phase	1	1/3	410	620	975						1/3	100	165	260	415	650	1050		
ع		1/2	315	490	775	1230					1/2	75	120	195	310	490	775		
Single		3/4	280	450	705	1120	1780				3/4	70	110	175	280	445	710	1125	
-	18	1	200	310	495	790	1260				1	50	80	125	200	315	500	795	1260
l	Г	114	190	300	480	765	1210	1930			1 1/2	50	75	120	190	305	485	770	1220
1		2 -	185	290	465	740	1175	1865			2	45	75	115	185	295	465	745	1180
1		3		210	335	535	850	1350			3	İ	55	85	135	210	340	535	855
L		5			125	195	315	500	790	1250	-	<u> </u>		30	50	80	125	200	310
		14	385	605	950			1			115	85	135	210	325	490	740		
	8	2	305	480	755	1170		1			2	70	105	165	255	390	590		1
12	1.	3	240	375	590	910	Į !		l	l	3	50	80	130	200	305	460	695	
1	L	5	160	250	390	605	920	1390		<u> </u>	5	<u> </u>	55	85	135	200	305	460	665
=	ŝ	5	630	995	1560			1	l		5	140	220	345	530	810	[

Use of cables smaller than recommended above will void warranty.

On single phase power supplies, line voltage at control box must not be less than 105 volts on 115 volt single-phase power supply or 210 volts on 230 volt single-phase power supply or 195 volts on 208 volt power supply while motor is running. Line voltage at magnetic starter must not be less than 215 volts on 230 volt 3-phase power supply.

The use of phase converters or starting controls, other than those furnished with the pump, or the substitution of overload heaters, voids the motor warranty.

Cable sizes and lengths are maximum allowable. Higher operating efficiency will be obtained by using next larger cable where lengths approach listed limits.

If a 208V motor is used, not more than 90% of the maximum cable length shown for 230V motors can be used.

Colt Industries



TABLE 1

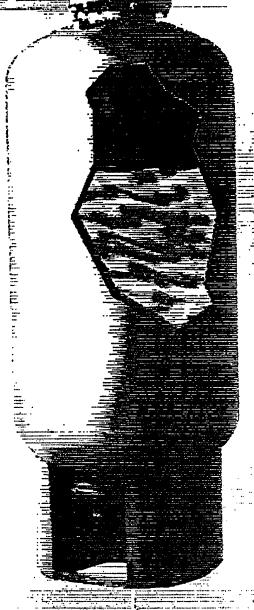
Fairbanks Morse

WESFLEX SUPERTANKS

Hydro-pneumatic Well and

Water System Tanks with

Replaceable and Fixed Bladders





Headquarters & Factory 1901 Maraton Ave. Detroit, MI 48211 (313) 875-5000 Fax: (313) 875-5004 West Coast Office & Warehouse 1900 D Petra Lane Placentia, CA 92870 (714) 524-0744 Fox: (714) 824-0344

D-26

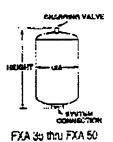


TYPE FXA WATER TANKS

ASMS-replaceable bladder type water system tanks for commercial, industrial and municipal well water and booster applications sizes 10 to 3063 gallong.

Type FXA water system control tanks are designed for jobs that require high pressure centralized water storage for community wells, high-rise buildings, impation systems, and pressure boosting applications where the utilinate in performance and quality is required. Hefty drawdown prevents pumps from ever cycling and allows saving of electrical energy by reducing frequent pump starts. Assists the pump in meeting poak-demands. Medals available up to 250 PSIG and higher working pressures. Efficient design allows use of emailer sizes to save on space and installation costs.

- ASME section VIII construction
- Transport separation of air and water ever the life of the system
- Water is "in the bag." Steel tank never touches water and is not subject to corresion.
- U Never water logs, no "red water"
- Replaceable bladder
- Standard pressures 125 PSI, 200 PSI and 250 PSI
- U Can be manifolded for additional capacity
- Factory pre-charged and field adjustable



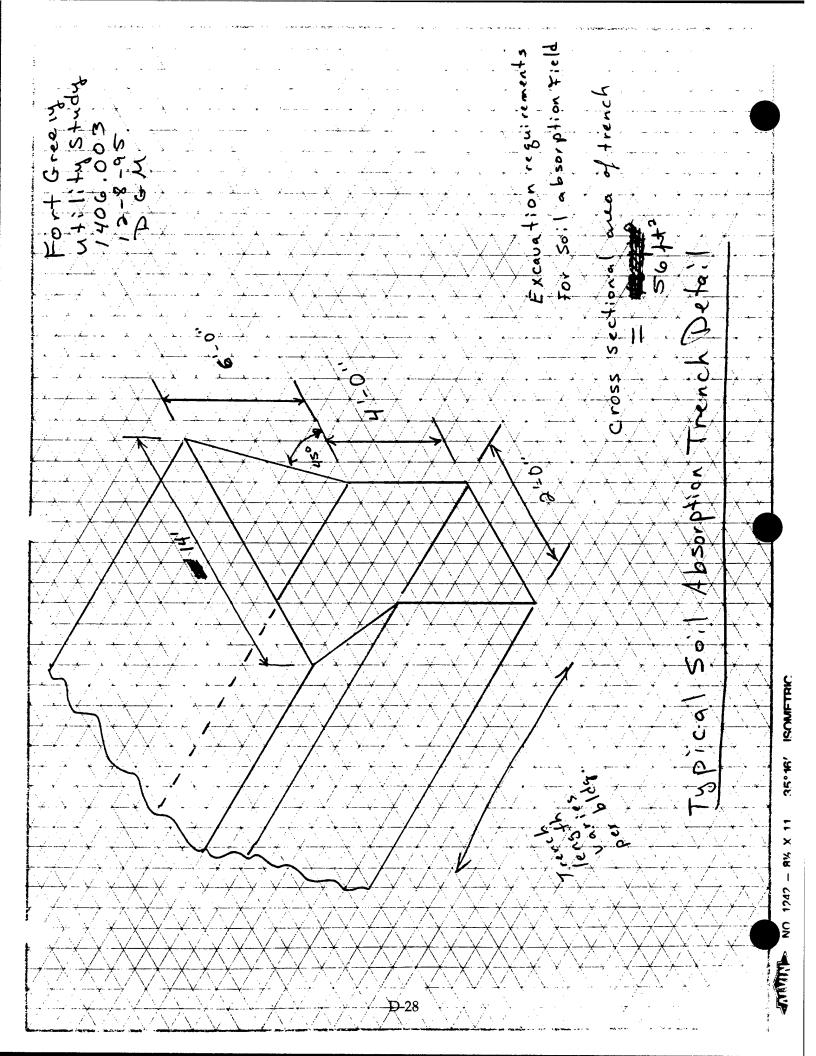
CIMABAYO LATTA	LIFT MING VALVE
- MANETER	OFT AIRS:
EFICHT	
CONNECTION	SYSTEM COMMECTION
EXA 05 thru EXA 800	17XA 1000 firm FXA 15600

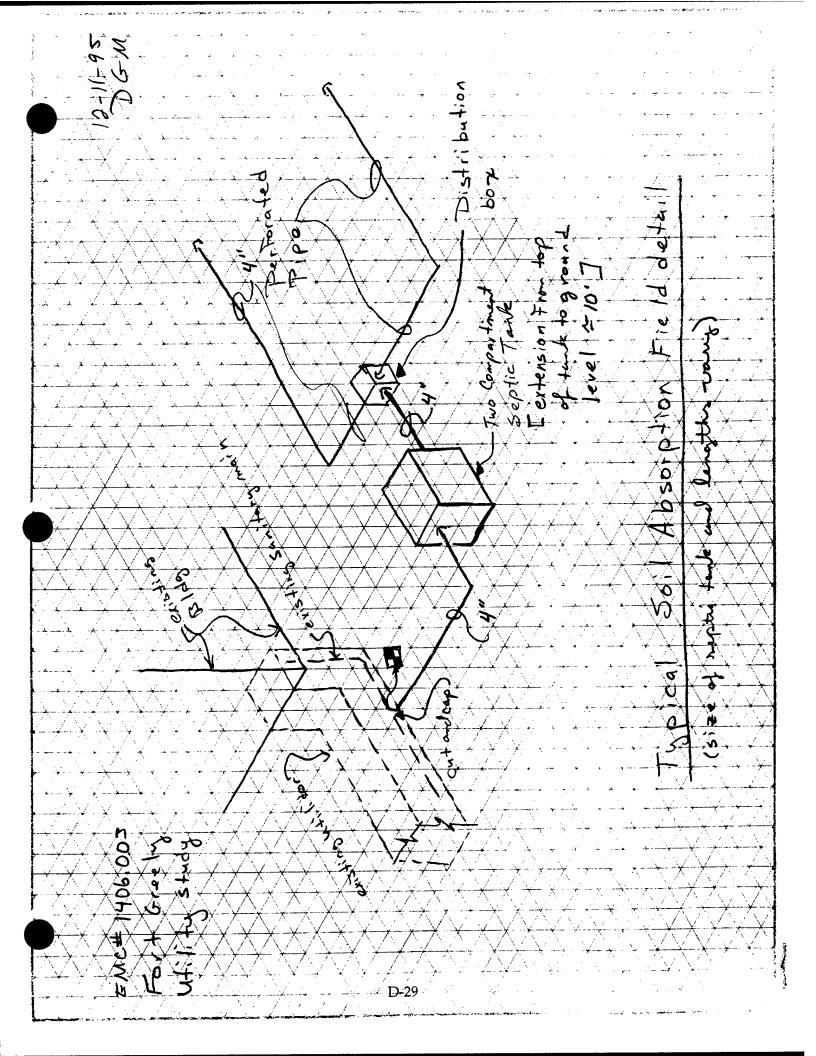
	विश्वास दे	:Jima:	eione	No.	NPT	pnksqld2
Model	Acceptance	Damer	Height	System	System	Wekjist
Number	Vol. (gals.)	(än)	(in)	Cornection	Cunnotina	Pounds
FXA 35	10	12	25	3/4"	-	40
FX4 50	13	14	25	3/4"	-	50
FXA 85	23	15	3/	1"	1/2°	95
FXA 139	35	20	87	1"	1/2"	126
FXA ZUU	53	24	43	1 1/2"	1/2'	210
FXA 300	70	24	65	1 1/2	3.4	225
FXA 400	166	30	49	1 1/2-	3/4"	300
FXA 500	132	30	57	2	3/4*	3330
FXA GGO	158	30	57	Z	3/4"	360
FXA 790	185	30	80 _	2	-	600
F/A 300	211	36	63	2"	3/4"	475
FXA 1000	264	36	27	3,	-	735
PXA 1200	317	36	gr.	3.	-	745
FXA 1400	370	36	317	3-		900
FXA 1600	422	49	54	3.	-	1210
FXA 2030	528	48	97	ÿ*	: -	1805
FXA 2600	660	48	114	4"		1430
PXA SOCGI.	792	-28	134	1.	<u>.</u>	1575
FXA 30005	792	5C	53	4"	-	2109
PXA 4900	1056	60	115	j	-	2038
FXA 5000	1920	60	100	4"	-	3246
FXA 7500	10800	72	140	13	-	4080
FXA 10000	2840	72	172			4920
PXA 15000	3969	72	743	4		5000

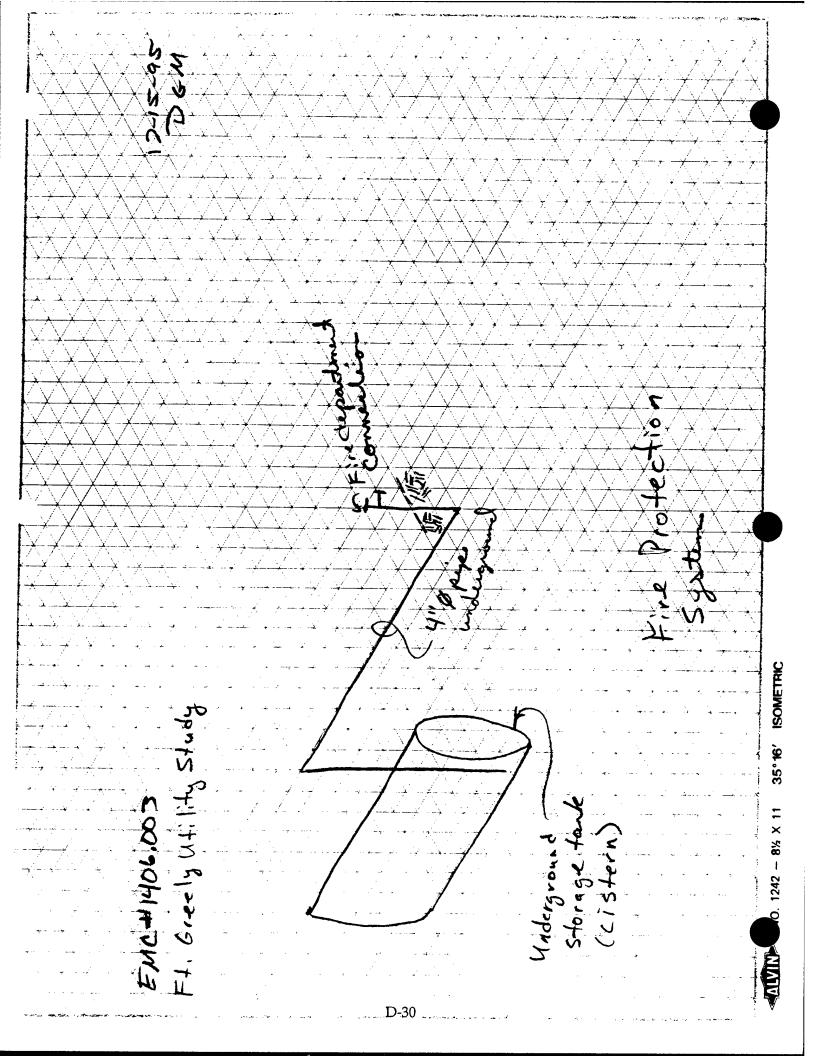
1861F moximum temperature - Factory pre-charge 50 PSI. Prima painted extenior finish

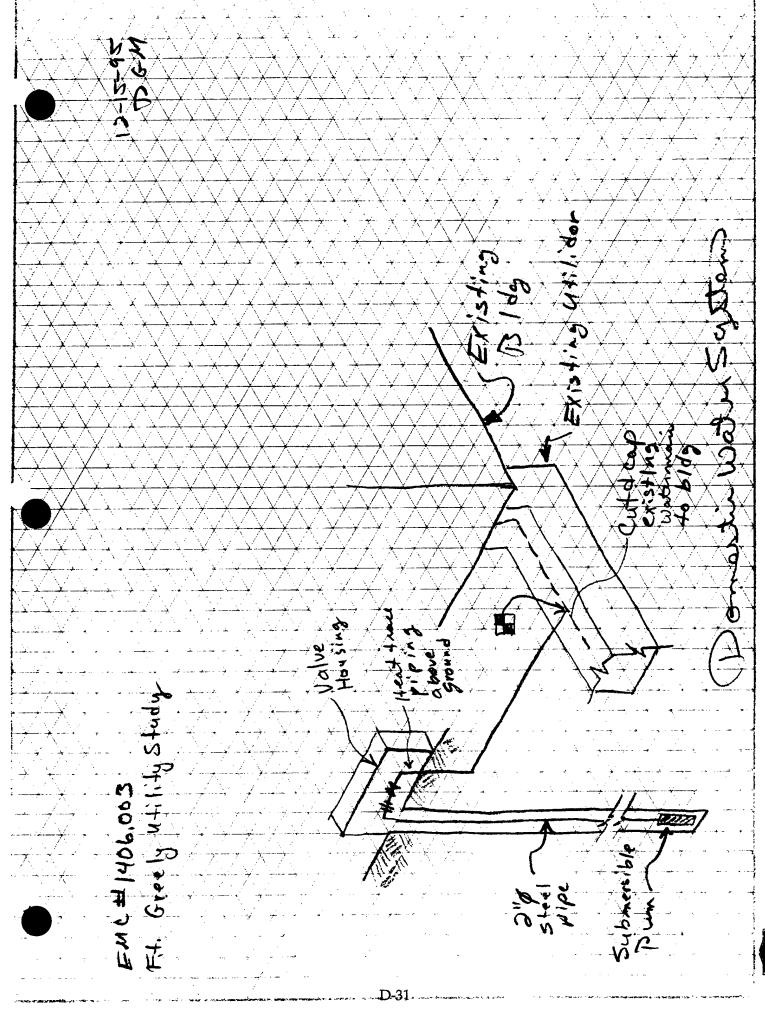
TYPICAL SPECIFICATIONS

Seen tank shall be Weeges moral number FXA ______ or approved equal.

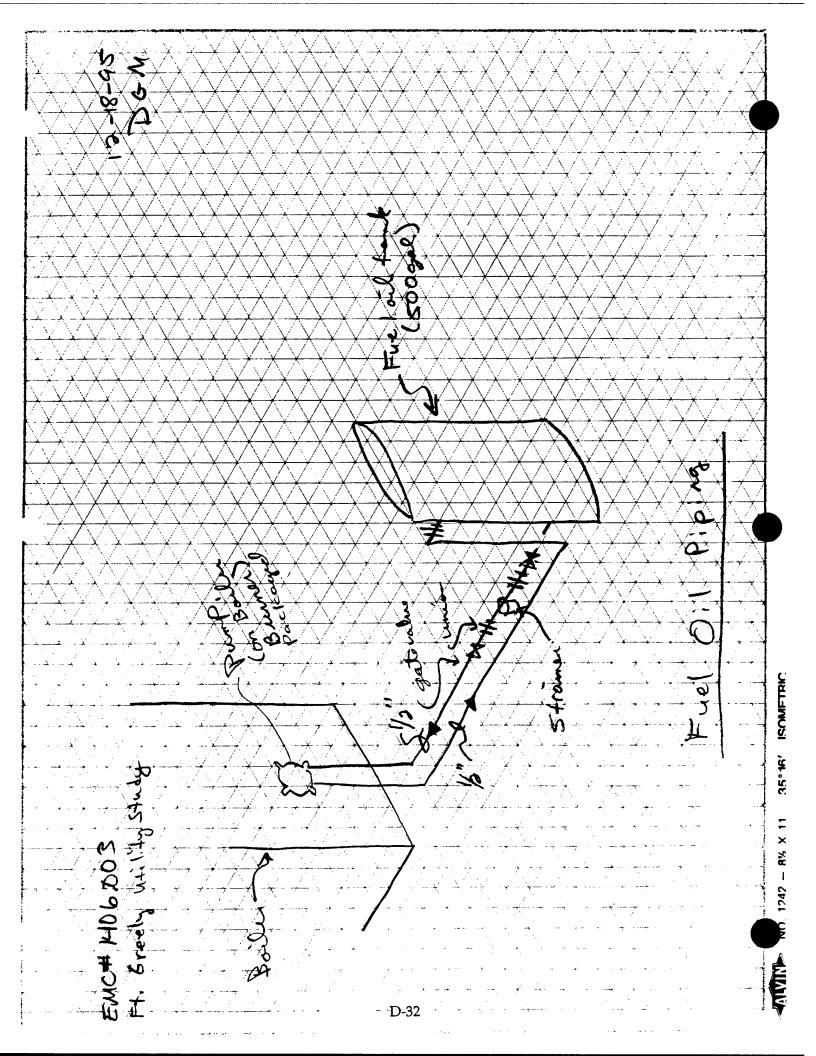








MINISTRIC NO. 1242 - 8% X 11 35°16' ISOMETRIC



2750 S. Wadsworth Blvd. 9755 Dogwood Rd. Suite C-200 Denver, CO 80227 (303) 988-2951

Suite 220 Roswell, GA 30075 (404) 642-1864

JOB 1406.003	
SHEET NO.	OF
CALCULATED BY 5 GM	DATE 12-15-95
CHECKED BY	DATE
SCALE	

Cost Estimate #'s

Septic Field

Piping to Septic tank (2 100 pt ea bldg) (8 bldgs total)

100ft * 56 ft2 = 5600ft3 excavation also 5600ft3 select backfill

100 ft of 4" Q cust inon pipe

MIL 15062 1003 pipe , assume 10, 1/4 4/8 bende MIL 15062 1233

septic tank (assume 3 tank sizes for all blogs)

4@ 1000 gul storage - MIL 02560 6001 1@ 2000 gul storage - MIL 02560 6002

3.@ 5000gel storage - MIL 03260 6003

Distribution box (assume 5 outlet box each bldg) 7@ MIL 62560 6021

Destorated Dipe: (refu to Equend Wheat for length per bldg) MIL 025112101 total querall = 13,100 H

Excountion For leach Field: (refer to spread wheet on amount per blog) MIL 02221 1103 total overall = 39,4,70 CY

Back 7:11 for each field (reper to spread sheet on amount per blog)

Mil 02221 6002 gravel backfill

@ 1,280cY

Sand backfill Mil 02221 800 1

@ 1,922CY

Select backfill Mil 02221 5003 Q 36,270CY

Geotextile Tabric Mil 02512 2001

@ 18,300 L. F. (36,600 17=)

2750 S. Wadsworth Blvd. 9755 Dogwood Rd. Suite C-200 Denver, CO 80227 (303) 988-2951

Suite 220 Roswell, GA 30075 (404) 642-1864

JOB	1406,00	25
SHEET NO.		OF
CALCULATED BY	1) GM	DATE 12-1 5-95
CHECKED BY		DATE
SCALE		

Cost Estimate #'s

Fire Protection

Storage tanks (11 total)

50,000 gal MIL 151771016

Excavation

7 500 Ft At each tank 80,880 Ft3 Hotal MIL 02221 1103

Backfill

1500 Ft each tank 16,5007+3 total MIL D2221 5003

Piping, Steel

= 100 H each tank

1100 pt total

MIL 15662 1003

2750 S. Wadsworth Blvd. 9755 Dogwood Rd. Suite C-200 Denver, CO 80227 (303) 988-2951

Suite 220 Roswell, GA 30075 (404) 642-1864

JOB	1406.00	3
SHEET NO.		OF
CALCULATED BY	DGM	DATE 12-18-95
CHECKED BY		DATE
SCALE		

Cost Estimate #'s Boiler Fuel oil system

500 gal steel fueloil tank (on legs) MIL

gete values (2total) MIL 15101 1103 PL Unions (4+0+al) MIL 15061 1821 PL

Piping (sch 90 Black steel) ~ 100 pt max (1/8"6) MIL 1506 1 1601 PL Strainers (1+0tal) MIL 15083 1102 PL

check value (1 total) MIL 15/11 1104 PL

E M C ENGINEERS, INC. 2750 S. Wadsworth Blvd. Suite C-200 Denver, CO 80227 (303) 988-2951 E M C ENGINEERS, INC. 9755 Dogwood Rd. Suite 220 Roswell, GA 30075 (404) 642-1864	SHEET NO.	06,00 <u>3</u> > GM	OF
Cost Estimate #15			
domestic Water Well			
Drill water well including casing			
@ 400 VLF MIL 02580	1001	(7 +0	tal)
Submersible water pump @25gpm, 527 H head MIL 1519	46 3001	(7 to t	CIA
Piping 2600 ft, 2" & steel pipe A	MIL 1506'1	1606 (4)	200/A total)
5torage tamk (see aprend bleet f (@ 2 tob) 100 gal \$2,060 (@ 2 tob) 200 gal \$2,900 (@ 1 took) 200 gal \$7,750 (@ 2 tooks) 2000 gal \$15,480	or each bldg:	Aizer) (Hyd 606 000	ro pruematic) O
Short off value at pump (2") MI (7total)	L 15101	1108 PL

Isolation union (2") (# total) MIL 15061 1886PL

Check walne (2") MIL 15111 1109 PL (7 total)

APPENDIX E ECO ANALYSIS

Table 2-1. Baseline O&M Cost Summary.

	Number of N	/laintenanc	e Personne	el Required
İ	Steam	Water	Sewer	Total
	System	System	System	Utilities
Foreman	0.80	0.05	0.15	1.00
Steam Fitter	1.00			1.00
Electrician	1.00			1.00
General Mechanic	0.50	0.50		1.00
Water Treatment Mechanic	-	-	1.00	1.00
Power Systems Mechanic	1.00			1.00
Boiler Operators	10.00			10.00
Subtotal	14.30	0.55	1.15	16.00
Annual Hours per Man	1,820	1,820	1,820	1,820
Burdened Cost per Hour	35	35	35	35
Annual Operating Cost	910,910	35,035	73,255	1,019,200

Table 3-2. Reduced Central Utility O&M Cost Summary.

	Number of N	/laintenanc	e Personne	l Required
	Steam	Water	Sewer	Total
	System	System	System	Utilities
Foreman	0.80	0.05	0.15	1.00
Steam Fitter	1.00			1.00
Electrician	1.00			1.00
General Mechanic	0.50	0.50		1.00
Water Treatment Mechanic	-	-	1.00	1.00
Power Systems Mechanic	1.00			1.00
Boiler Operators	8			8
Subtotal	12.30	0.55	1.15	14.00
Annual Hours per Man	1,820	1,820	1,820	1,820
Burdened Cost per Hour	35	35	35	35
Annual Operating Cost	783,510	35,035	73,255	891,800

Table 4-2. Distributed Utilities O&M Cost Summary.

	Number of N	faintenanc	e Personne	el Required
	Steam	Water	Sewer	Total
	System	System	System	Utilities
Foreman	0.60	0.30	0.10	1.00
Steam Fitter	1.00			1.00
Electrician	-			-
General Mechanic	1.20	0.60	0.20	2.00
Water Treatment Mechanic	-	-	-	-
Power Systems Mechanic	-	-	-	-
Boiler Operators	-	-	-	-
Subtotal	2.80	0.90	0.30	4.00
Annual Hours per Man	1,820	1,820	1,820	1,820
Burdened Cost per Hour	35	35	35	35
Annual Operating Cost	178,360	57,330	19,110	254,800

				Annual Ope	Annual Operating Costs			
		Abandoned	Abandoned	Abandon		Mixed	Mixed	Mixed
		Buildings	Buildings	Selected	Distributed	Utilities	Otilities	Utilities
	Baseline	at 45 F	No Heat	Utilidors	Utilities	(Flow Only)	(Flow + Heat)	(Insulation)
	Baseline	at 45 F	No Heat	Utilidors	Utilities	(Flow Only)	(Flow + Heat)	(Insulation)
		Buildings	Buildings	Selected	Distributed	Utilities	Utilities	Utilities
		Abandoned	Abandoned	Abandon		Mixed	Mixed	Mixed
Steam System			•	•				-
Fuel Oil Use (gal)	1,791,484	1,005,444	536,336	396,735	270,658	270,658	277,725	273,462
Electricity Use (kWh)	466,502	344,794	332,179	332,179	221,383	221,383	221,383	221,383
Electric Demand (kW)	82	39	38	38	4	4	4	4
Fuel Oil Cost (\$)	1,307,783	733,974	391,525	289,617	197,580	197,580	202,739	199,627
Electricity Cost (\$)	39,576	27,467	26,462	26,462	17,636	17,636	17,636	17,636
O&M Cost (\$)	910,910	783,510	783,510	783,510	178,360	178,360	178,360	178,360
Total Steam Cost (\$)	2,258,270	1,544,951	1,201,497	1,099,589	393,576	393,576	398,735	395,623

Water System								
Water Use (gal)	9,585,079	996,820	996,820	996,820	996,820	ı	9,275,020	3,285,000
Electricity Use (kWh)	387,853	40,336	40,336	40,336	40,336	821,934	375,306	132,925
Electric Demand (kW)	,	•	,	,	ı		•	•
Electricity Cost (\$)	27,576	2,868	2,868	2,868	2,868	58,440	26,684	9,451
O&M Cost (\$)	35,035	35,035	35,035	35,035	57,330	35,035	35,035	35,035
Chlorination Costs (\$)	4,026	419	419	419	•	272	272	272
Total Water Cost (\$)	66,637	38,322	38,322	38,322	60,198	93,747	61,991	44,758

Effluent (gal)	7,197,281	816,163	816,163	816,163	816,163	21,128,782 10,091,182	10,091,182	4,101,163
Electricity Use (kWh)	251,919	251,919	251,919	251,919	1	•	•	•
Electric Demand (kW)	•	,	•	,	,	١	•	•
Electricity Cost (\$)	19,502	19,502	19,502	19,502	•	•	•	•
O&M Cost (\$)	73,255	73,255	73,255	73,255	19,110	19,110	19,110	19,110
Chlorination Costs (\$)	4,020	272	272	272	•	•	•	•
Total Sewer Cost (\$)	22.96	93,029	93,029	93,029	19.110	19,110	19,110	19,110

lotal Utilities								
Fuel Oil Use (gal)	1,791,484	1,005,444	536,336	396,735	270,658	270,658	277,725	273,462
Electricity Use (kWh)	1,106,274	637,048	624,434	624,434	261,718	1,043,317	596,689	354,308
Electric Demand (kW)	85	39	38	38	4	4	4	4
Electricity Cost (\$)	86,654	49,836	48,831	48,831	20,504	76,075	44,320	27,087
Fuel Oil Cost (\$)	1,307,783	733,974	391,525	289,617	197,580	197,580	202,739	199,627
O&M Cost (\$)	1,027,246	892,491	892,491	892,491	254,800	232,777	232,777	232,777
Total Utilities Cost (\$)	2,421,683	1,676,301	1,332,847	1,230,939	472,884	506,432	479,836	459,491

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The state of the s								
Distributed Steam Bollers					778,779	778,779	778,779	778,779
Boiler Fuel Systems					388,761	388,761	388,761	388,761
Water Wells & Fire Cisterns					1,039,861			
Septic Systems		-			667,277	667,277	667,277	667,277
Water Distribution Heater						1	19,800	19,800
Water Pipe Insulation							,	143,267
Total Construction Cost (\$)		•			2,874,678	1,834,817	1,854,617	1,997,884
SIOH (5.5%)	,	,	•	•	158,107	100,915	102,004	109,884
Design (6%)	,	•	,	•	172,481	110,089	111,277	119,873
Total Investment Cost (\$)	-	1		-	3,205,266	2,045,821	2,067,898	2,227,641
Annual Operating Costs								
Electricity Cost (\$)	86,654	49,836	48,831	48,831	20,504	76,075	44,320	27,087
Fuel Oil Cost (\$)	1,307,783	733,974	391,525	289,617	197,580	197,580	202,739	199,627
O&M Cost (\$)	1,027,246	892,491	892,491	892,491	254,800	232,777	232,777	232,777
Total Utilities Cost (\$)	2,421,683	1,676,301	1,332,847	1,230,939	472,884	506,432	479,836	459,491
UPV Factors								
Electricity	14.47	14.47	14.47	14.47	14.47	14.47	14.47	14.47
Fuel Oil	17.01	17.01	17.01	17.01	17.01	17.01	17.01	17.01
O&M	13.47	13.47	13.47	13.47	13.47	13.47	13.47	13.47
Life Cycle Costs								
Investment	•	•	•	•	3,205,266	2,045,821	2,067,898	2,227,641
Electricity	1,253,887	721,131	706,591	106,591	296,687	1,100,809	641,310	391,944
Fuel Oil	22,245,394	12,484,896	6,659,846	4,926,383	3,360,839	3,360,839	3,448,590	3,395,660
O&M	13,837,000	12,021,849	12,021,849	12,021,849	3,432,156	3,135,506	3,135,506	3,135,506
Total Life Cycle Cost (\$)	37,336,282	25,227,876	19,388,286	17,654,823	10,294,947	9,642,975	9,293,304	9,150,752

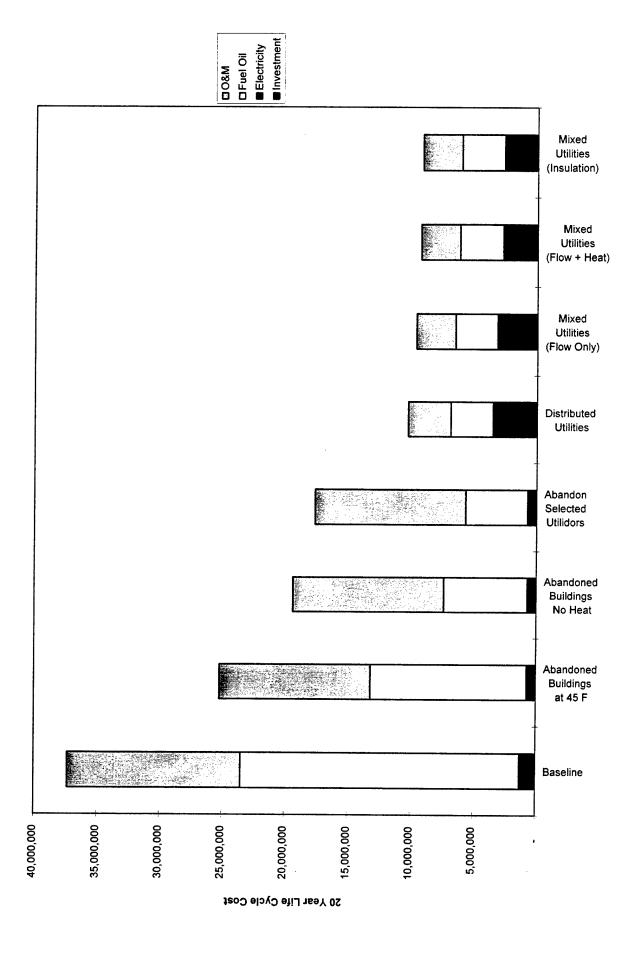




Table 4-1. Distributed Boiler Sizing and Energy Use.

		Required	Annual Co	Annual Consumption Annual Energy Cost	Annual Ene	ergy Cost
Bldg	Building	Boiler	Fuel		Fuel	
*	Description	Capacity	ō	Electricity	ō	Electricity
		(MBH)	(gal)	(kwh)	(\$)	(\$)
501	РОЅТ НО	154	20,080	17,870	17,590	1,271
503	GYMNASIUM	1,083	28,846	17,870	25,269	1,271
504	FIRE STATION	245	6,512	15,137	5,704	1,076
909	CONSOLIDATED PW	984	26,201	22,075	22,952	1,570
909	CENTRAL HEATING PLANT	1,238	32,950	22,075	28,864	A/N
612	TANK MAINTENANCE	738	19,645	22,075	17,209	1,570
615	MOTOR POOL	989	18,246	17,870	15,984	N/A
658	TEMP MOTOR POOL	1,004	26,737	17,870	23,422	1,271
725	зсноог	2,157	57,422	32,797	50'305	2,332
820	HOUSING UNIT	623	17,010	17,870	14,900	1,271
821	HOUSING UNIT	629	17,010	17,870	14,900	1,271
TOTALS		9,527	253,648	203,512	222,196	11,630

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JOB 1406.003	Ft Greely
SHEET NO.	OF
CALCULATED BY DG M	DATE 1-8-96
CHECKED BY	DATE
SCALE	

Fuel oil system for boiler at School

Cost estimate:

components:

1) excavation For tank - 5000gol tank (dblwall), tank mine = 6'0 x 29'-6" Long

vol = 834 H3

excavate 10'x 8'x 32' = 2560 H3 and 10% for angled sides = 2800 H3

= 104 CY MIL 02225 1453 ?

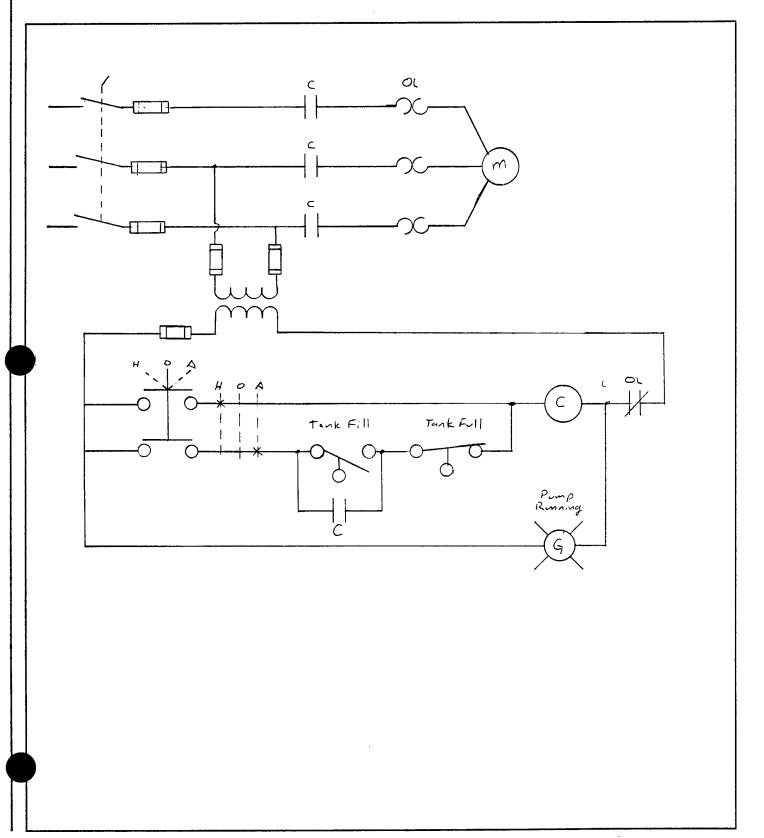
- 2) Concrete anchor pad assume 6" deep x 8' wide x 32' long 0.5*8'*30' = 128 /13 MIL 03311 1166
 = 41.74 Cy Reinforced
- 3) 5000 gal, DbI wall Fuel oil storage tank: MIL 15176.4002 PL
- 4) backfill 2800ft3 834ft3 138ft3 = 1838ft3 = [68 cy] (select)
- 5) Containment busin / tank Sump (42"9) \$12110
- 6) FOS Pump (15gpm) \$725
- 7) 100 ft, 3/4" FOS PIPE MIL 15001 1602 PL
- 8) 50 gal day tank \$1/100
- 9) de de l'alors MIL 15061 1636 [L MIL 15101 1104 PH HIL 15061 1878 -L
- 10) Leak Dodactor Sustemn NIL 2176 6011 PL

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9755 Dogwood Rd.
Suite 220
Roswell, GA 30075
(404) 642-1864

JOB FT. GI	eely		_
SHEET NO.			_
CALCULATED BY	Morris	DATE 1/9/96	_
CHECKED BY		_ DATE	_
sour None			



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2750 S. Wadsworth Blvd. 9755 Dogwood Rd. Suite C-200 Denver, CO 80227 (303) 988-2951

Suite 220 Roswell, GA 30075 (404) 642-1864

JOB 1406-003	Ft. Greely
SHEET NO.	/
CALCULATED BY SEJ	DATE 1-9-96
CHECKED BY	DATE
SCALE	

Fuel Oil System for Bldgs 50B, 605, 615, 820, 4821

Cost Estimates

- 1) Excavation for full tank 2000 gal -> 270 ft3 6' Dia x 10' Lang Execute 10'x8'x 12' = 960 ft3 $+10\% \frac{96}{1056 + 1^3} = 39 c + 10\%$
- 2.) Conc. anchor pad 6" x 8' x 12' = 108 C4
- 3.) 2000 gal, Fuel Tank
- 4.) Backfill 1056 270 48 = 738 F43 = 27 C4

APPENDIX E ECO SIMULATIONS AND ANALYSIS

Table 2-1. Baseline O&M Cost Summary.

	Number of M	laintenanc	e Personne	el Required
	Steam	Water	Sewer	Total
!	System	System	System	Utilities
Foreman	0.80	0.05	0.15	1.00
Steam Fitter	1.00			1.00
Electrician	1.00			1.00
General Mechanic	0.50	0.50		1.00
Water Treatment Mechanic	-	-	1.00	1.00
Power Systems Mechanic	1.00			1.00
Boiler Operators	10.00			10.00
Subtotal	14.30	0.55	1.15	16.00
Annual Hours per Man	1,820	1,820	1,820	1,820
Burdened Cost per Hour	40.00	40.00	40.00	40.00
Annual Operating Cost	1,041,040	40,040	83,720	1,164,800

Table 3-2. Reduced Central Utility O&M Cost Summary.

	Number of M	laintenance	e Personne	l Required
	Steam	Water	Sewer	Total
	System	System	System	Utilities
Foreman	0.80	0.05	0.15	1.00
Steam Fitter	1.00			1.00
Electrician	1.00			1.00
General Mechanic	0.50	0.50		1.00
Water Treatment Mechanic	-	-	1.00	1.00
Power Systems Mechanic	1.00			1.00
Boiler Operators	8			8.
Subtotal	12.30	0.55	1.15	14.00
Annual Hours per Man	1,820	1,820	1,820	1,820
Burdened Cost per Hour	40	40	40	40
Annual Operating Cost	895,440	40,040	83,720	1,019,200

Table 4-2. Distributed Utilities O&M Cost Summary.

	Number of M	laintenance	e Personne	l Required
	Steam	Water	Sewer	Total
	System	System	System	Utilities
Foreman	0.60	0.20	0.20	1.00
Steam Fitter	-			-
Electrician	-			-
General Mechanic	0.80	0.20		1.00
Water Treatment Mechanic	-	-	•	-
Power Systems Mechanic	-	-	•	-
Boiler Operators	-	•	•	-
Subtotal	1.40	0.40	0.20	2.00
Annual Hours per Man	1,820	1,820	1,820	1,820
Burdened Cost per Hour	40	40	40	40
Annual Operating Cost	101,920	29,120	14,560	145,600

				Annual Ope	Annual Operating Costs			
		Abandoned	Abandoned	Abandon		Mixed	Mixed	Mixed
		Buildings	Buildings	Selected	Distributed	Utilities	Utilities	Utilities
	Baseline	at 45 F	No Heat	Utilidors	Utilities	(Flow Only)	(Flow + Heat)	(Insulation)
Steam System								
Fuel Oil Use (gal)	1,791,484	1,022,993	485,708	346,107	190,112	197,179	197,179	192,916
Electricity Use (kWh)	529,044	344,794	332,179	332,179	159,362	159,362	159,362	159,362
Electric Demand (kW)	85	39	38	38	18	18	18	18
Fuel Oil Cost (\$)	1,307,783	746,785	354,567	252,658	138,782	143,941	143,941	140,829
Electricity Cost (\$)	44,023	27,467	26,462	26,462	12,695	12,695	12,695	12,695
O&M Cost (\$)	1,041,040	895,440	895,440	895,440	101,920	101,920	101,920	101,920
Total Steam Cost (\$)	2,392,846	1,669,691	1,276,469	1,174,560	253,397	258,556	258,556	255,444

Water Use (gal) 9,571,746 Electricity Use (kWh) 387,313								
		646,622	646,622	646,622	646,622	3,285,000	8,924,822	3,285,000
	313	26,165	26,165	26,165	26,165	132,925	361,136	132,925
Electric Demand (KVV)		1	•	1	•	,	1	1
Electricity Cost (\$) 27,5	538	1,860	1,860	1,860	1,860	9,451	25,677	9,451
O&M Cost (\$) 40,(040	40,040	40,040	40,040	29,120	40,040	40,040	40,040
Chlorination Costs (\$)	4,020	272	272	272	,	272	272	272
Total Water Cost (\$) 71,5	71,598	42,172	42,172	42,172	30,980	49,763	686'59	49,763

Effluent (gal) 7,187,405 Electricity Use (kWh) 251,919 Electric Demand (kW) -	405							
		478,979	478,979	478,979	478,979	478,979	478,979	478,979
Electric Demand (kW)	251,919	251,919	251,919	251,919	,	1	1	,
()		ı			ı	1	ı	1
Electricity Cost (\$) 19,5	19,502	19,502	19,502	19,502	,	1	t	,
O&M Cost (\$) 83,7	83,720	83,720	83,720	83,720	14,560	14,560	14,560	14,560
Chlorination Costs (\$) 4,0	4,020	272	272	272	,	,	,	1
Total Sewer Cost (\$) 107,2	107,242	103,494	103,494	103,494	14,560	14,560	14,560	14,560

lotal Utilities								
Fuel Oil Use (gal)	1,791,484	1,022,993	485,708	346,107	190,112	197,179	197,179	192,916
Electricity Use (kWh)	1,168,277	622,878	610,264	610,264	185,527	292,287	520,498	292,287
Electric Demand (kW)	82	39	38	38	18	18	18	18
Electricity Cost (\$)	91,063	48,829	47,824	47,824	14,555	22,146	38,372	22,146
Fuel Oil Cost (\$)	1,307,783	746,785	354,567	252,658	138,782	143,941	143,941	140,829
O&M Cost (\$)	1,172,840	1,019,744	1,019,744	1,019,744	145,600	156,792	156,792	156,792
Total Utilities Cost (\$)	2,571,686	1,815,357	1,422,134	1,320,226	298,937	322,879	339,104	319,767

Investment Costs								
Distributed Steam Boilers					376,039	376,039	376,039	376,039
Boiler Fuel Systems					142,477	142,477	142,477	142,477
Water Wells & Fire Cisterns					1,049,944			
Septic Systems					526,136	526,136	526,136	526,136
Water Distribution Heater							19,800	19,800
Water Pipe Insulation								76,549
Total Construction Cost (\$)		1	ı	•	2,094,596	1,044,652	1,064,452	1,141,001
SIOH (5.5%)	,	ı	ı	ı	115,203	57,456	58,545	62,755
Design (6%)	ı	1	•	•	125,676	62,679	63,867	68,460
Total Investment Cost (\$)	-	ı	1	•	2,335,475	1,164,787	1,186,864	1,272,216
Annual Operating Costs								
Electricity Cost (\$)	91,063	48,829	47,824	47,824	14,555	22,146	38,372	22,146
Fuel Oil Cost (\$)	1,307,783	746,785	354,567	252,658	138,782	143,941	143,941	140,829
O&M Cost (\$)	1,172,840	1,019,744	1,019,744	1,019,744	145,600	156,792	156,792	156,792
Total Utilities Cost (\$)	2,571,686	1,815,357	1,422,134	1,320,226	298,937	322,879	339,104	319,767
UPV Factors								
Electricity	14.47	14.47	14.47	14.47	14.47	14.47	14.47	14.47
Fuel Oil	17.01	17.01	17.01	17.01	17.01	17.01	17.01	17.01
O&M	13.47	13.47	13.47	13.47	13.47	13.47	13.47	13.47
Life Cycle Costs								
Investment	•	•	•	•	2,335,475	1,164,787	1,186,864	1,272,216
Electricity	1,317,677	706,552	692,012	692,012	210,616	320,453	555,240	320,453
Fuel Oil	22,245,394	12,702,807	6,031,178	4,297,715	2,360,678	2,448,429	2,448,429	2,395,500
O&M	15,798,157	13,735,946	13,735,946	13,735,946	1,961,232	2,111,988	2,111,988	2,111,988
Total Life Cycle Cost (\$)	39,361,227	27,145,305	20,459,135	18,725,672	6,868,001	6,045,657	6,302,521	6,100,157

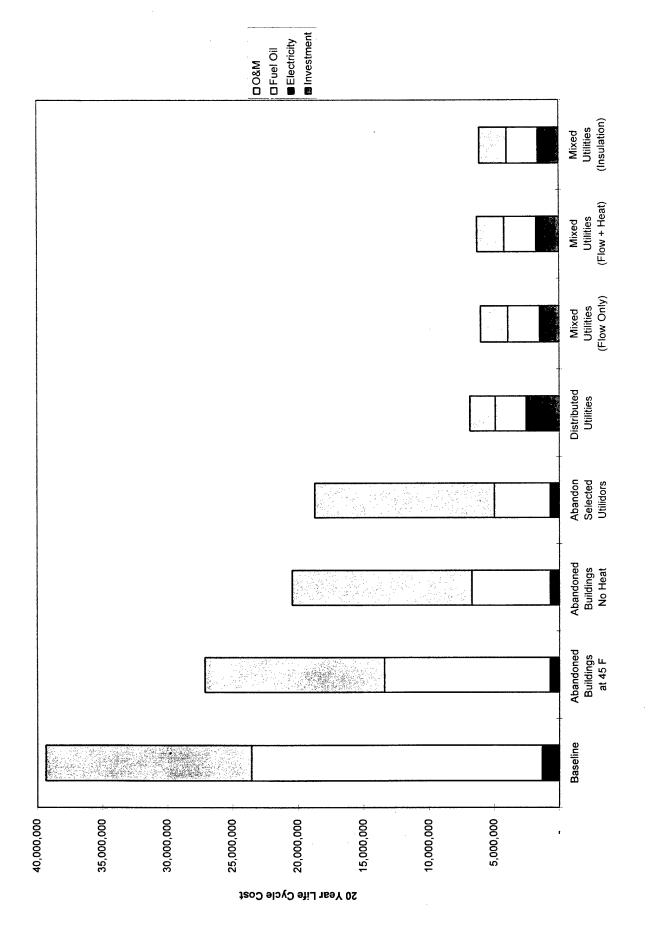






Table 4-1. Distributed Boiler Sizing.

		Required	Annual Cc	Annual Consumption	Annual Energy Cost	rgy Cost		Days	Fuel
Bldg	Building	Boiler	Fuel		Fuel		Fuel	petween	System
#	Description	Capacity	ō	Electricity	ïÖ	Electricity	Tank	Fills	Cost
		(MBH)	(gal)	(kwh)	(\$)	(\$)	(gal)	(days)	(\$)
501	Post HQ	791	21,037	17,870	15,357	1,271	N/A	A/N	N/A
503	Gymnasium	926	24,711	17,870	18,039	1,271	2,000	30	21,766
504	Fire Station	256	6,822	15,137	4,980	1,076	650	35	3,592
909	Public Works	1,032	27,449	22,075	20,038	1,570	2,000	27	21,766
909	Steam Plant	A/N	A/A	A/N	N/A	A/N	N/A	∀/Z	A/N
615	Motor Pool	718	19,116	17,870	13,955	1,271	2,000	38	21,766
633	Sewage Trmt	A/N	N/A	A/A	N/A	A/N	N/A	A/N	Ϋ́Z
725	School	2,080	55,337	32,797	40,396	2,332	2,000	33	30,055
820	Housing	670	17,820	17,870	13,009	1,271	2,000	41	21,766
821	Housing	670	17,820	17,870	13,009	1,271	2,000	41	21,766
TOTALS		7,145	190,112	159,362	138,782	11,331			142,477

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JOB1406.003	Ft Greely
SHEET NO.	OF
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CHECKED BY	DATE

Fuel oil system for boiler at School

Cost estimate:

components:

1) excavation For tank - 5000gol tank (db/wall), tank size = 6'\$ x 29'-6" Log vol = 834 H3

SCALE

excavate 10'x 8'x 32' = 2560 H3 add 10% for angled sides

= 2800143

= 104 cy MIL 02225 1453 ?

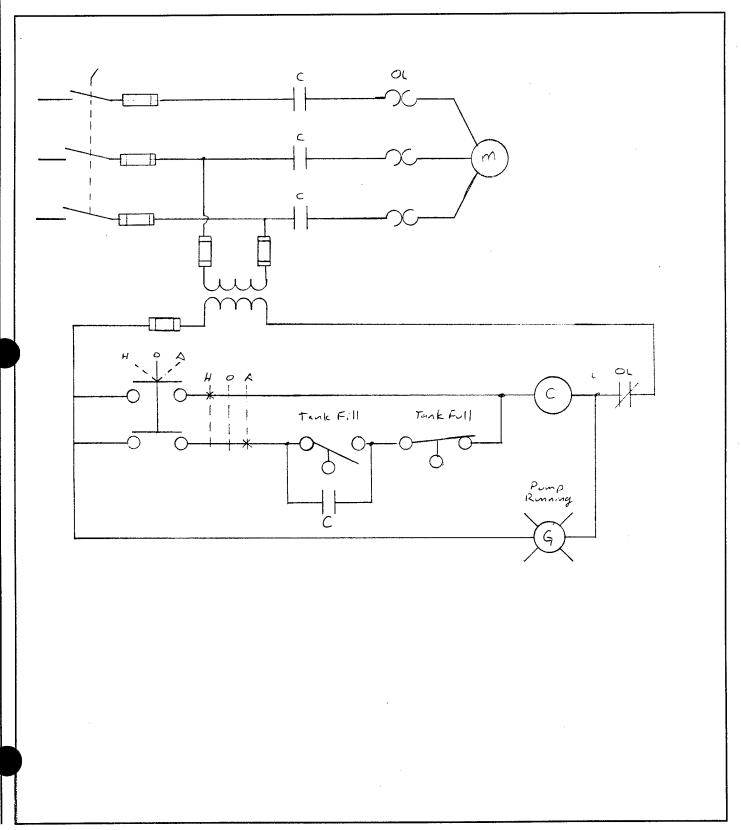
- 2) Convete anchor pad assume 6" deep x 8' wide x 32' long 0.5'*8'*30' = 128 H3 MIL 03311 1166
 = 41.74 Cy Reinforced
- 3) 5000 gal, DbI wall Fuel oil storage tank: MIL 15176.4002 PL
- 4) back fill 2800 ft3 834 ft3 128 ft3 = 1838 ft3 = 68 cy (select)
- 5) Containment busin / tank Sump (42"4) \$2110
- 6) FOS Pump (15gpm) \$725
- 7) 100 ft, 3/4" FOS PIPE MIL 15061 1602 PL
- 8) 50 gal day tank \$1,100
- 9) Lgate values MIL 15061 1632 FL MIL 15101 1104 P4 MIL 150 61 1882 FL 4 unions
- reak Defection Eystern MIL 5176 6011 PL

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JOВ	T. Greely		
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CALCULATED BY	D. Morris		DATE 1/9/96
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20115	

Fuel Oil System for Bldgs 503, 605, 615, 820, 4821 Cost Estimates

1.) Exequation for full tank - 2000 gal
$$\rightarrow$$
 270 ft3
6' Dia × 10' Long
Execute 10'*8' × 12' = 960 ft3
+ 10% $\frac{96}{1056 \, \text{ft}^3} = 39 \, \text{ct}$

- 2.) Conc. anchor pad 6" × 8' × 12' = 108 CT
- 3.) 2000 gal, Fuel Tank
- 4.) Backfill 1056 270 48 = 738 F43 = 27 C4

1-8-96 DCA

APPENDIX F

LCCA AND ECONOMIC ANALYSIS

- F2 Fuel Oil Tank 5000 Gallons
- F3 Fuel Oil Tank 2000 Gallons
- F4 Fuel Oil Tank 1000 Gallons
- F5 Water Wells to Cisterns
- F6 Septic Field
- F7 Water Pipe Insulation
- F8 Potable Water Heater

Distributed Steam Boilers

Mon 18 Mar 1996 Eff. Date 03/18/06

U.S. Army Corps of Engineers PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study Ft. Greely Utility Study (Distributed Boilers)

TIME 11:51:38

TITLE PAGE

Fort Greely Utility Study Install Distributed Boilers in Unheated Abandoned Buildings Distributed Boilers

JVS Designed By: Estimated By:

TCP Prepared By: 03/18/96 03/18/06 Preparation Date: Effective Date of Pricing:

\$00.0 Sales Tax:

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Currency in DOLLARS

CREW ID: FRBK94 UPB ID: ANCH94

F1-1

U.S. Army Corps of Engineers
PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)

Mon 18 Mar 1996 Eff. Date 03/18/06 TABLE OF CONTENTS

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SUMMARY PAGE	Scope1	DETAIL PAGE	1	ion		10			16	19	leating Plt		
SUMMARY REPORTS	PROJECT DIRECT SUMMARY - Scope	DETAILED ESTIMATE	1. Bldg. 503 - Gymnasium 09. HVAC	2. Bldg. 504 - Fire Station 09. HVAC	3. Bldg. 605 - Cons. Public Works 09. HVAC	4. Bldg. 615 - Motor Pool 09. HVAC	5. Bldg. 725 - School	6. Bldg. 820 - Housing	7. Bldg. 821 - Housing		8. Bldg. 606 - Central Heating Plt 09. HVAC	9. Bldg. 612 - Tank Maintenance	10. Bldg. 658 - Temporary Motor Pool

* * * END TABLE OF CONTENTS * * *

F1-2

No Backup Reports...

U.S. Army Corps of Engineers
PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
** PROJECT DIRECT SUMMARY - Scope **

SUMMARY PAGE

TIME 11:51:38

	QUANTITY UOM MATERIAL	MATERIAL	MANHRS	LABOR E	LABOR EQUIPMNT	TOTAL COST UNIT COST	UNIT COST
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	, ; ; ; ; ; ; ;	1		 	! ! ! !		
1 Bldg. 503 - Gymnasium	1.00 EA	36,892	357	14,737	998	52,495	52495.39
2 Bldg. 504 - Fire Station		20,396	179	7,392	88	27,876	27875.68
	1.00 EA	35,134	322	13,294	758	49,185	49185.30
4 Bldg. 615 - Motor Pool	1.00 EA	26,751	265	10,948	581	38,280	38280.26
5 Bldg. 725 - School	1.00 EA	73,898	410	16,893	1,009	91,799	91799.45
6 Bldg. 820 - Housing	1.00 EA	26,557	263	10,874	580	38,011	38011.27
7 Bldg. 821 - Housing	1.00 EA	26,557	263	10,874	580	38,011	38011.27
	1.00 EA	36,892	357	14,737	866	52,495	52495.39
	1.00 EA	26,751	265	10,948	581	38,280	38280.26
10 Bldg. 658 - Temporary Motor Pool	1.00 EA	36,892	357	14,737	998	52,495	52495.39
TOTAL Distributed Boilers	1.00 EA	346,721	3,039	125,433	6,775	478,930	478,930 478929.65
Contractor's Overhead						71,839	
						1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
SUBTOTAL						550,769	
Contractor's Profit						55,077	
						1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
SUBTOTAL						605,846	
Contractor's Bond						18,175	
						1 1 1 1 1 1 1 1 1 1 1 1	
TOTAL INCL INDIRECTS						624,021	
Escalation						24,961	
SUBTOTAL						648,982	
Contingency						129,796	
						1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
TOTAL INCL OWNER COSTS						778,779	

Distributed Boilers - Fort Greely Utility Study Ft. Greely Utility Study (Distributed Boilers) U.S. Army Corps of Engineers 1. Bldg. 503 - Gymnasium PROJECT GRLYMS:

TIME 11:51:38

DETAIL PAGE

LABOR EQUIPMNT TOTAL COST QUANTY UOM MATERIAL MANHRS 1.09. HVAC

1. Bldg. 503 - Gymnasium

1.09. HVAC

This system includes all equipment, distrbution systems, controls, and energy supply systems required by the heating, ventilating, and air conditioning system.

1.09.02. Heating Generating Systems

This subsystem includes steam, hot water, furnace, and heater systems. Fuel include coal, oil, gas and electric unless otherwise noted

1.09.02.01. Steam Boilers

separators, pumps, heat exchangers, boiler feed units, etc. This assembly would also include fittings and specialties and the flue stack. The unit of Assemblies include boilers, expansion tanks, chemical feeders, air measure at the assembly level is each.

M MIL AA <15624 1012 > 1764 MBH Oil Fired H2O Tube Blr

2.00 EA Stl Shell w/Insul Jacket & Ctrls

TOTAL Steam Boilers

43,671

815

10,825

265

32,031

43,671

815

10,825

265

32,031

43,671

815

10,825

265

32,031

217

92 684 311 64

2

37 529 64

0 13 0

131

0 7

TOTAL Heating Generating Systems

1.09.04. Distribution Systems

This includes systems that distribute heated and cooled air, ventilating and exhaust air, hot and chilled water, steam, and glycol heating

1.09.04.02. Steam Distribution Systems

sleeves, and pipe insulation. The unit of measure at the assembly level is Assemblies include pipe and fitting, including supports, wall and floor

139 9 206 263 52 73 25 375 476 140 77 31 46 12 57 12 20.00 LF H ΕA EA EF Ľ 3.00 EA 3.00 00.9 1.00 00.9 20.00 00.9 125# Bronze Mtd w/Threaded Valve <15185 1011 > 6"D Pipe,1-1/2"Thk Fbgs Pipe Cvr Not Incl Hangers or Fittings M MIL AA <15185 1008 > 3"D Pipe,1" Thk Fbgs Pipe Cover AA <15061 2388 > 6" Thread-O-Let, 300# Forge Stl <15061 1638 > 3" 90 Degree Ell,150# MI Black
<15061 1698 > 3" Tee, Red Out 150# MI Black M MIL AA <15101 1304 > 3" Iron Body Gate Valve, Thrd Not Incl Hangers or Fittings <15061 1612 > 6"(15cm) A-53 Pipe, Sch 40 M MIL AA <15061 1608 > 3"(80mm) A-53 Pipe, Sch 40 w/Fire Retardant Jackets w/Fire Retardant Jackets Ş M MIL AA A MIL AA B MIL MIL MIL

Currency in DC

UPB ID: CREW ID: FRBK94

92 70 33

0 1 0

28 64 27

EA EA LF 4.00 1

1.00

Y-Type, 250#(113kg) Screwed Ends

M MIL AA <15083 1103 > 3/4" Strainer (Iron Body)

20% added for 6" fitting

<15125 2001 > 3/4"Float&Tstat Steam Trap,15PSI

<15061 1602 > 3/4"(20mm) A-53 Pipe, Sch 40

<15061 1822 > 3/4" Union, 150# MI Black

M MIL AA • M MIL AA • M MIL AA •

Not Incl Hangers or Fittings

19

0

44

1.00 EA

QUIP ID: ALASKA

LABOR ID: FRBK94,

F1-4

1.09. HVAC

U.S. Army Corps of Engineers
PROJECT GRLYM5: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
1. Bldg. 503 - Gymnasium

TIME 11:51:38 N DETAIL PAGE

				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					11111
M MIL AA	<15185	1002 >	> 3/4"D Pipe,1"Thk Fib Pipe Cover	10.00 LF	60	1	25	0	
			w/Fire Retardant						
M MIL AA	<15101	1104 >	. 3/4" Bronze 125# Gate Valve Threaded Brazed or Coldered	2.00 EA	18	-	39	0	
M MIL AA	<15111	1105 >		2.00 EA	33	1	39	0	
					•	ć	Ċ	,	
M MIL AA	<15851>	1145	<pre>S 12"X 3' Kound Flue/Vent Flue Galv Dbl Wall Breech/Smoke Pipe</pre>	10.00 EA	4. V	x 0	328	n	008
M MIL AA	<15855	1186 >	> 12" Round Flue/Vent Pipe Tees	2.00 EA	137	4	166	8	
M MTT. AA	717875	1216	Galv Dbl Wall Breech/Smoke Pipe	2 00 6	7,	-	u u	-	
THE E	-			3	c c	-1	n n	4	
M MIL AA	<15855	1196 >	> 12" Round Flue/Vent Top Caps	2.00 EA	109	-	55	п	
M MIL AA	<15063	1004	calv DD1 wall Breech/Smoke Fipe > 1"(25mm) Cu Pipe/Tubing Type L	20.00 LF	26	=	57	+	
M	101317	, 1011	Flue Drain	6	. 27	•	7	c	
THE WITH W			Regular Port, Flue Drain		ò	-1	ř	>	
M MIL AA	. <15063	1044	> 1" 90 Degree Elbow, Copper	5.00 EA	4	1	9	1	
:			Flue Drain		ļ	•	1	,	
M MIL AA	<15063	1006	> 1-1/2"(40mm) Cu Pipe/Tubing Tp L	30.00 LF	79	m c	115	٦.	
or area e			-		*	4	Ď	•	
M MIL AA	<15122	1105 3	> 1-1/2" x 1-1/2" Brz PRV, Thrd	2.00 EA	260	2	71	7	
7	12021	1636	Boiler Reliet Valves	6	,	-	36	c	
WHITE WE			Relief Valve		n	•	ń	>	
M MIL AA	<15092	1201	> 2.07" ID Steel Pipe Sleeve	2.00 EA	49	2	42	м	
:			Roof Pipe Boot		;	,	,	,	
M MIL AA	<15063 1003		> 3/4"(20mm) Cu Pipe/Tubing Type L Boiler Drain	15.00 LF	14	-	36	0	
M MIL AA	<15063 1043		> 3/4" 90 Degree Elbow, Copper Roiler Drain	4.00 EA	н	н	38	0	
M MIL AA	<15063	1003	> 3/4"(20mm) Cu Pipe/Tubing Type L	30.00 LF	28	73	72	1	
:					,	,	;		
M MIL AA	<15121	12021	> 3/4"Thrd St Press Regul & Red, 1B Sgl Seat, Sprg Load Dir Act Diap	1.00 EA	102	1	4.	0	
			Boiler Fill						
M MIL AA	<15104	1102	> 3/4" Thrd Ball Valve, CS Trim Regular Port, Boiler Fill	3.00 EA	42	8	29	н	
M MIL AA	<15083	1103	> 3/4" Strainer (Iron Body)	1.00 EA	44	0	19	0	
			Y-Type, 250#(113kg) Screwed Ends, Boiler Fill						
M MIL AA	1 <15080	3201	> 3.5"Diameter Dial Pressure Gauge Aluminum Case 0-300PSI Roller Fill	1.00 EA	52	н	58	0	
M MIL AA	<15122	1102	> 3/4"x3/4"Brz Press Rlf Vlv, Thrd	1.00 EA	14	г	22	0 .	
M MIL AA	<15063	1043	> 3/4" 90 Degree Elbow, Copper	5.00 EA	7	п	48	0	
M MIL AA	5063 1023		1 4 4 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	6000	•	•		•	

Currency in DOLLARS

CREW ID: FRBK94 UPB ID: ANCH94

U.S. Army Corps of Engineers
PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
1. Bldg. 503 - Gymnasium

TIME 11:51:38

٣ DETAIL PAGE

QUANT	TY UOM	QUANTY UOM MATERIAL	MANHRS	LABOR	LABOR EQUIPMNT	TOTAL COST
25GPM at	1.00 EA	2,150	13	554	9	2,710
umps ch 40 cings	40.00 LF	25	e	107	1	134
Condensate Return Dumps M MIL AA <15185 1002 > 3/4"D Pipe, TTMk Fib Pipe Cover 40.0	40.00 LF	36	Э	102	Ħ	139
lve red	2.00 EA	18	1	39	0	58
nsate Return Pumps Swing Check Valve Brz 125# nrd,Brazed or Soldered	1.00 EA	17	0	19	0	36
te Return Pumps Pipe Sleeve	1.00 EA	25	H	40	T	99
M CIV AA <02113 6011 > Rem L/2" to 4" D Asb Pipe Insul 5.0	5.00 LF	20	1	22	7	44
4"(10cm)D ection to	5.00 LF	0	0	19	0	19
existing system (8). M MIL AA <15061 1636 > 2" 90 Degree ELL,150# MI Black 1.00 For connection to existing system	00 EA	N	н	22		25
TOTAL Steam Distribution Systems		4,861	93	3,912	51	8,824
TOTAL Distribution Systems		4,861	93	3,912	51	8,824
TOTAL HVAC		36,892	357	14,737	998	52,495
TOTAL Bldg. 503 - Gymnasium		36,892	357	14,737	998	52,495

Currency in I

CREW ID: FRBK94 UPB ID:

COUIP ID: ALASKA LABOR ID: FRBK9

F1-6

U.S. Army Corps of Engineers
SRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
2. Bldg. 504 - Fire Station PROJECT GRLYMS:

TIME 11:51:38

DETAIL PAGE

LABOR EQUIPMNT TOTAL COST QUANTY UOM MATERIAL MANHRS 2.09. HVAC

2. Bldg. 504 - Fire Station

This system includes all equipment, distrbution systems, controls, and energy supply systems required by the heating, ventilating, and air conditioning system. 2.09. HVAC

2.09.02. Heating Generating Systems This subsystem includes steam, hot water, furnace, and heater systems. Fuel include coal, oil, gas and electric unless otherwise noted.

Assemblies include boilers, expansion tanks, chemical feeders, air separators, pumps, heat exchangers, boiler feed units, etc. This assembly would also include fittings and specialties and the flue stack. The unit of 2.09.02.01. Steam Boilers

41 3,761 93 16,076 2.00 EA would also include assembly level is each.

measure at the assembly level is each.

M MIL AA <15624 1004 > 490 MBH Oil Fired H2O Tube Blr

Stl Shell w/Insul Jacket & Ctrls

19,878 19,878 41 3,761 93 16,076 TOTAL Steam Boilers

19,878

41

3,761

93

16,076

TOTAL Heating Generating Systems

This includes systems that distribute heated and cooled air, ventilating and exhaust air, hot and chilled water, steam, and glycol heating 2.09.04. Distribution Systems

F1-7

Assemblies include pipe and fitting, including supports, wall and floor sleeves, and pipe insulation. The unit of measure at the assembly level is 2.09.04.02. Steam Distribution Systems

M MIL AA <15061 1608 > 3"(80mm) A-53 Pipe, Sch 40 20.00 LF Not Incl Hangers or Fittings M MIL AA <15185 1008 > 3"D Pipe,1" Thk Pbgs Pipe Cover 20.00 LF
4
M MIL AA <15061 1638 > 3" 90 Degree Ell,150# MI Black 6.00 EA M MIL AA <15061 1698 > 3" Tee. Red Out 150# MI Black 1.00 EA
1
M MIL AA <15185 1002 > 3/4"D Pipe,1"Thk Fib Pipe Cover 10.00 LF w/Fire Retardant Jackets
M MIL AA <15101 1104 > 3/4" Bronze 125# Gate Valve 2.00 EA Threaded, Brazed or Soldered
MIL AA <15111 1105 > 3/4" Swing Check Valve Brz 125# 2.00 EA for Thrd, Brazed or Soldered Inst
MIL AA <15061 1609 > 4"(10cm) A-53 Pipe, Sch 40 6.00 LF Not Incl Hangers or Fittings
MIL AA <15185 1009 > 4"D Pipe,1" Thk Fbgs Pipe Cover 6.00 LF w/Fire Retardant Jackets

EQUIP ID: ALASKA LABOR ID: FRBK94

Currency in DOLLARS

UPB ID: ANCH94 CREW ID: FRBK94

Distributed Boilers - Fort Greely Utility Study Ft. Greely Utility Study (Distributed Boilers) U.S. Army Corps of Engineers PROJECT GRLYM5:

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Bldg. 504 - Fire Station

TIME 11:51:38

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DETAIL PAGE

36 50 30 140 64 92 410 149 52 63 83 84 65 183 118 332 38 131 50 40 100 145 109 64 85 LABOR EQUIPMNT TOTAL COST 0 0 0 0 0 0 0 0 2 0 28 48 115 83 38 67 19 22 29 28 64 246 9 35 79 36 72 43 103 33 33 57 47 7.1 0 MANHRS N QUANTY UOM MATERIAL 42 57 14 ~ 64 5 162 45 13 30 56 37 67 260 49 28 102 44 14 3.00 EA 1.00 EA 30.00 LF 30.00 LF EA EA ΕA EA ΕA ΕÀ ΕĄ ΕA 끉 ΕA ጟ ΕA EA ΕA EA 1.00 EA ΕA ΕA 2.00 EA 20.00 LF 2.00 EA 5.00 1 2.00 1 2.00 2.00 15.00 3.00 5.00 2.00 2.00 1.00 1.00 4.00 6.00 2.00 4.00 30.00 1.00 1.00 Tp T ы ב MIL AA <15121 1202 > 3/4"Thrd St Press Regul & Red, IB MIL AA <15122 1102 > 3/4"x3/4"Brz Press Rlf Vlv, Thrd MIL AA <15080 3201 > 3.5"Diameter Dial Pressure Gauge 3/4" Copper Tee - Straight Sweat Y-Type, 250#(113kg) Screwed Ends <15061 1635 > 1-1/2" 90 Deg Ell, 150# MI Black <15125 2001 > 3/4"Float&Tstat Steam Trap,15PSI MIL AA <15063 1006 > 1-1/2"(40mm) Cu Pipe/Tubing Tp I MIL AA <15185 1005 > 1-1/2"D Pipe,1"Thk Fib Pipe Cvr Sgl Seat, Sprg Load Dir Act Diap Galv Dbl Wall Breech/Smoke Pipe M MIL AA <15104 1103 > 1" Threaded Ball Valve, CS Trim <15061 2388 > 4" Thread-O-Let, 300# Forge Stl Galv Dbl Wall Breech/Smoke Pipe Galv Dbl Wall Breech/Smoke Pipe Galv Dbl Wall Breech/Smoke Pipe M MIL AA <15063 1004 > 1"(25mm) Cu Pipe/Tubing Type L MIL AA <15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type M MIL AA <15855 1214 > 8"Rnd Flue/Vent Adj Roof Flash > 3/4"(20mm) Cu Pipe/Tubing Type MIL AA <15122 1105 > 1-1/2" x 1-1/2" Brz PRV, Thrd MIL AA <15104 1102 > 3/4" Thrd Ball Valve, CS Trim <15855 1184 > 8" Round Flue/Vent Pipe Tees > 3/4" 90 Degree Elbow, Copper MIL AA <15063 1043 > 3/4" 90 Degree Elbow, Copper 8" Round Flue/Vent Top Caps MIL AA <15855 1134 > 8"x 5' Round Flue/Vent Pipe Y-Type, 250#(113kg) Screwed M MIL AA <15063 1044 > 1" 90 Degree Elbow, Copper 2.07" ID Steel Pipe Sleeve Regular Port, Boiler Fill MIL AA <15083 1103 > 3/4" Strainer (Iron Body) <15061 1822 > 3/4" Union, 150# MI Black > 3/4" Strainer (Iron Body) Regular Port, Flue Drain w/Fire Retardant Jackets Aluminum Case 0-300PSI Boiler Relief Valves Boiler Relief Valve Ends, Boiler Fill Roof Pipe Boot Boiler Drain Boiler Drain Boiler Fill Boiler Fill Boiler Fill Boiler Fill Boiler Fill Boiler Fill Flue Drain Flue Drain M MIL AA <15063 1023 > M MIL AA <15855 1194 > ٨ MIL AA <15063 1043 <15083 1103 <15092 1201 <15063 1003 Ş A A M MIL AA MIL AA MIL AA MIL AA MIL AA MIL

CREW ID: FRBK94

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2.09. HVAC

U.S. Army Corps of Engineers
PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
2. Bldg. 504 - Fire Station

DETAIL PAGE

TIME 11:51:38

MON AMANA	QUANTY UOM MATERIAL	MANHRS	LABOR EQUIPMNT	TOTAL COST
		!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!		
M MIL AA <15720 2002 > Duplex Pump & Motor, 1 HP, 25GPM 1.00 EA Cnds Pump w/CI Receiver, Float	2,150	13	554 6	2,710
Sw, Condensate Keturn Fumps M MIL AA <15061 1602 > 3/4"(20mm) A-53 Pipe, Sch 40 Not Incl Hangers or Fittings	25	m	107	134
Condensate Return Pumps MIL AA <15185 1002 > 3/4"D Pipe, 1TThk Fib Pipe Cover 40.00 LF	36	m	102	139
M MIL AA <15101 1104 > 3/4" Bronze 125# Gate Valve 2.00 EA Threaded, Brazed or Soldered	18	r.	39	0 58
	17	0	19 (36
Inst. Condensate Return Fumps M MIL AA <15092 1201 > 2.07 ID Steel Pipe Sleeve 1.00 EA	25	н	40	99
M CIV AA <02113 6011 > Rem 1/2" to Asb Pipe Insul 5.00 LF	20	H	22	2 44
All-Cell Glove, Semi-Isolated CIV AA <02111 9202 > Demo Metal Pipe to 4"(10cm)D 5.00 LF Cut piping for connection to	0	0	19	0 19
existing system (8). M MIL AA <15061 1636 > 2" 90 Degree ELL,150# MI Black 1.00 EA For connection to existing system	74	г	22	0 25
TOTAL Steam Distribution Systems	4,320	98	3,631 47	7,998
TOTAL Distribution Systems	4,320	98	3,631 47	2,998
TOTAL HVAC	20,396	179	7,392 88	8 27,876
TOTAL Bldg. 504 - Fire Station	20,396	179	7,392 88	8 27,876

LABOR ID: FRBK94

Distributed Boilers - Fort Greely Utility Study Ft. Greely Utility Study (Distributed Boilers) U.S. Army Corps of Engineers PROJECT GRLYM5:

3. Bldg. 605 - Cons. Public Works

TIME 11:51:38

DETAIL PAGE

LABOR EQUIPMNT TOTAL COST QUANTY UOM MATERIAL MANHRS 3.09. HVAC

3. Bldg. 605 - Cons. Public Works

3.09. HVAC

This system includes all equipment, distrbution systems, controls, and energy supply systems required by the heating, ventilating, and air conditioning system.

3.09.02. Heating Generating Systems
This subsystem includes steam, hot water, furnace, and heater systems. Fuel include coal, oil, gas and electric unless otherwise noted.

3.09.02.01. Steam Boilers

2.00 EA M MIL AA <15624 1011 > 1596 MBH Oil Fired H20 Tube Blr would also include fittings and specialties and the flue stack. The unit of separators, pumps, heat exchangers, boiler feed units, etc. This assembly Assemblies include boilers, expansion tanks, chemical feeders, air measure at the assembly level is each.

Stl Shell w/Insul Jacket & Ctrls

40,361

206

9,382

229

30,273

40,361

706

9,382

229

30,273

40,361

706

9,382

229

30,273

TOTAL Steam Boilers

TOTAL Heating Generating Systems

This includes systems that distribute heated and cooled air, ventilating and exhaust air, hot and chilled water, steam, and glycol heating. 3.09.04. Distribution Systems

3.09.04.02. Steam Distribution Systems
Assemblies include pipe and fitting, including supports, wall and floor sleeves, and pipe insulation. The unit of measure at the assembly level is

M MII	Z AA	<15061	1608	M MIL AA <15061 1608 > 3"(80mm) A-53 Pipe, Sch 40	20.00 LF	7.7	ъ	139	1
M	V V	781717	1008	Not Incl Hangers or Fittings M MIF AA <15185 1008 > 3"D Dine 1" Thk Fhos Dine Cover	20.00 LF	31	7	09	H
	<u>.</u>	t t)) !	w/Fire Retardant Jackets					
MII	L AA	<15101	1304	M MIL AA <15101 1304 > 3" Iron Body Gate Valve, Thrd	3.00 EA	476	2	206	7
				125# Bronze Mtd w/Threaded Valve					
MII	L AA	<15061	1638	M MIL AA <15061 1638 > 3" 90 Degree Ell,150# MI Black	6.00 EA	46	9	263	7
MI	L AA	<15061	1698	M MIL AA <15061 1698 > 3" Tee, Red Out 150# MI Black	1.00 EA	12	1	52	0
MII	L AA	<15061	1602	M MIL AA <15061 1602 > 3/4"(20mm) A-53 Pipe, Sch 40	10.00 LF	9	1	27	0
				Not Incl Hangers or Fittings					
MI	L AA	<15185	1002	M MIL AA <15185 1002 > 3/4"D Pipe,1"Thk Fib Pipe Cover	10.00 LF	6		25	0
				w/Fire Retardant Jackets					
MI	L AA	<15101	1104	M MIL AA <15101 1104 > 3/4" Bronze 125# Gate Valve	2.00 EA	18	1	39	0
				Threaded, Brazed or Soldered					
M	C AA	<15111	1105	M MIL AA <15111 1105 > 3/4" Swing Check Valve Brz 125#	2.00 EA	33		39	0
				for Thrd, Brazed or Soldered Inst					
MI	L AA	<15061	1612	M MIL AA <15061 1612 > 6"(15cm) A-53 Pipe, Sch 40	6.00 LF	57	7	73	
				Not Incl Hangers or Fittings					
ME	L AA	<15185	101	M MIL AA <15185 1011 > 6"D Pipe,1-1/2"Thk Fbgs Pipe Cvr	6.00 LF	12		25	0
				w/Fire Retardant Jackets					

311 64 33

684

35 58 73 131

217 92

CREW ID: FRBK94 UPB II

Currency in

37

U.S. Army Corps of Engineers
PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
3. Bldg. 605 - Cons. Public Works

TIME 11:51:38 DETAIL PAGE

	QUANTY UOM MATERIAL	TERIAL MANHRS	RS	LABOR EQUIPMNT	NT TOTAL	AL COST
B MIL AA <15061 2388 > 6" Thread-O-Let, 300# Forge Stl	3.00 EA	140	6	375	13	529
Added 20% for 6" fixture M MIL AA <15083 1103 > 3/4" Strainer (Iron Body)	1.00 EA	44	0	19	0	64
		į	,	ć	ć	ć
MIL AA <15125 2001 >	1.00 EA	6. A	٦,	28	> -	70
MIL AA <15061	4.00 PA	644	ι α	328	ı m	800
M MIL AA <15855 1145 > 12"X 3' Kound Fide, venc File Galv Dbl Wall Breech/Smoke Pipe) F	,) -		
M MIL AA <15855 1186 > 12" Round Flue/Vent Pipe Tees	2.00 EA	137	4	166	7	305
M MIL AA <15855 1216 > 12"Rnd Flue/Vent Adj Roof Flash	2.00 EA	35	н	55	-	91
2017	2 00 54	109	-	55	-	165
M MIL AA <15855 1196 > 12" Kound Fide/vent top caps Galv Dbl Wall Breech/Smoke Pipe) 1	ı	!		
M MIL AA <15063 1004 > 1"(25mm) Cu Pipe/Tubing Type L	20.00 LF	26	г	57	 1	83
Flue Drain M MIL AA <15104 1103 > 1" Threaded Ball Valve, CS Trim	2.00 EA	37	1	47	0	84
	6	4	-	9	-	65
M MIL AA <15063 1044 > 1" 90 begree bibow, copper Flue Drain		•	•	3	,	
M MIL AA <15063 1006 > 1-1/2"(40mm) Cu Pipe/Tubing Tp L	30.00 LF	29	٣	115	-	183
MIL AA <15185 1005 >	30.00 LF	34	73	83	7	118
w/Fire Retardant Jackets w with an 215122 1105 > 1-1/2" x 1-1/2" Brz PRV. Thid	2.00 EA	260	2	71	7	332
M MIL AA <15061 1635 > 1-1/2" 90 Deg Bll, 150# MI Black	2.00 EA	m	Н	35	0	38
MIL AA <15092 1201 > 2.07" ID Steel Pipe Sleeve	2.00 EA	49	7	79	٣	131
Roof Pipe Boot		ļ	,	Ç	c	Ü
M MIL AA <15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L	15.00 LF	14	-	36	>	0
M MIL AA <15063 1043 > 3/4" 90 Degree Elbow, Copper	4.00 EA	ı	1	38	0	40
Boiler Drain M MIL AA <15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L	30.00 LF	28	8	72	1	100
Boiler Fill	r c		-	4	c	145
M MIL AA <15121 1202 > 3/4"INTG St Fress Regul & Red, LD St Stat, Sprg Load Dir Act Diap		1	1		,	
BOLLET FILL M MIL AA <15104 1102 > 3/4" Thrd Ball Valve, CS Trim	3.00 EA	42	73	67	1	109
	1.00 EA	44	0	19	0	64
`						
M MIL AA <15080 3201 > 3.5"Diameter Dial Pressure Gauge	1.00 EA	57	г	28	0	85
M MIL AA <15122 1102 > 3/4 x 3/4 x 3/4 "Brz Press Rlf Vlv, Thrd	1.00 EA	14	7	22	0	36
M MIL AA <15063 1043 > 3/4" 90 Degree Elbow, Copper	5.00 EA	73	1	48	0	20
Boiler Fill	4 00 0	F	-	29	0	30
M Mib AA <15063 1023 > 3/4" Copper ree - Scraight Sweat Boiler Fill		1	İ			

CREW ID: FRBK94 UPB ID: ANCH94

Currency in DOLLARS

EQUIP ID: ALASKA

LABOR ID: FRBK94

LABOR ID: FRBK9

U.S. Army Corps of Engineers	PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study	Ft. Greely Utility Study (Distributed Boilers)	
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3.09. HVAC

3. Bldg. 605 - Cons. Public Works

TIME 11:51:38

DETAIL PAGE

nō	QUANTY UOM MATERIAL	TERIAL	MANHRS	LABOR 1	SQUIPMNT	LABOR EQUIPMNT TOTAL COST
25GPM at	1.00 EA	2,150	13	554	9 1 1	2,710
umps th 40 tings	40.00 LF	25	м	107	н	134
e Cover	40.00 LF	36	æ	102	П	139
s alve ered	2.00 EA	18	1	39	0	58
ssate Return Pumps Swing Check Valve Brz 125# Ird, Brazed or Soldered	1.00 EA	17	0	19	0	36
	1.00 EA	25	+	40	-	99
D Asb Pipe Insul	5.00 LF	20	н	22	7	44
CIV AA <02111 9202 > Demo Metal Pipe to 4" (10cm)D Cut piping for connection to	5.00 LF	0	0	19	0	1.9
MIL AA <15061 1636 > 2" 90 Degree ELL,150# MI Black For connection to existing system	1.00 EA	6	ਜ	22	0	25
TOTAL Steam Distribution Systems	•	4,861		3,912	51	8,824
TOTAL Distribution Systems	•	4,861	93	3,912	51	8,824
TOTAL HVAC	,	35,134	322	13,294	758	49,185
TOTAL Bldg. 605 - Cons. Public Works	•	35,134	322	13,294	758	49,185

U.S. Army Corps of Engineers
PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
4. Bldg. 615 - Motor Pool

TIME 11:51:38

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		1001 10001						
4.09. HVAC			QUANTY UOM MATERIAL	WATERIAL	MANHRS	LABOR EQUIPMNT	; ;	TOTAL COST
4. Bldg.	615 - Motor Pool							
4.05	4.09. HVAC This system includes all equipment, distrbution systems, controls, energy supply systems required by the heating, ventilating, and air conditioning system.	distrbution systems, controls, and ne heating, ventilating, and air						
	 Heating Generating Systems This subsystem includes steam, hot water, furnace, and heat include coal, oil, gas and electric unless otherwise noted. 	Heating Generating Systems This subsystem includes steam, hot water, furnace, and heater systems. Fuel include coal, oil, gas and electric unless otherwise noted.						
	4.09.02.01. Steam Boilers Assemblies include boilers, expansion separators, pumps, heat exchangers, bo would be include fittings and special measure at the assembly level is each	Assemblies include boilers, expansion tanks, chemical feeders, air separators, pumps, heat exchangers, boiler feed units, etc. This assembly would also include fittings and specialties and the flue stack. The unit of mansure at the assembly level is each						
		M MIL AA <15624 1008 > 1274 MBH Oil Fired H2O Tube Blr Stl Shell w/Insul Jacket & Ctrls	2.00 EA	21,890	172	7,036	530	29,456
F1-:		TOTAL Steam Boilers	'	21,890	172	7,036	530	29,456
13		TOTAL Heating Generating Systems	•	21,890	172	7,036	530	29,456
	4.09.04. Distribution Systems This includes systems that distribute heated and cooled air, vent: and exhaust air, hot and chilled water, steam, and glycol heating	bute heated and cooled air, ventilating water, steam, and glycol heating.						
	4.09.04.02. Steam Distribution Systems Assemblies include pipe and sleeves, and pipe insulation MBH.	9. Steam Distribution Systems Assemblies include pipe and fitting, including supports, wall and floor sleeves, and pipe insulation. The unit of measure at the assembly level is MBH.						
		M MIL AA <15061 1608 > 3"(80mm) A-53 Pipe, Sch 40	20.00 LF	7.7	ю	139		217
		M MIL AA <15185 1008 > 3"D Pipe, I" Thk Fbgs Pipe Cover WFire Retardant Jackete	20.00 LF	31	6	09	п	92
		M MIL AA <15101 1304 > 3" Iron Boots Gate Value Thrd	3.00 EA	476	ស	206	7	684
		<15061 1638 >	6.00 EA	46	9	263	8	311
		MIL AA <15061 1698 > 3" Tee, Red Out 150# MI Black M MIT AA <15061 1609 3 /48 /2000 3 /48		12	-	52	0	64
		15185 1002 >	10.00 LF	ه د	н .	27	0 (33
		w/Fire Retardant <15101 1104 > 3/4" Bronze 125#		, ,	-	6 6	> 6	ري د د د
		Threaded, Brazed <15111 1105 > 3/4" Swing Check		3 6	٠ -	` o	o c	3 6
		for Thrd, Brazed or Soldered Inst M MIL AA <15061 1612 > 6"(15cm) A-53 Pipe, Sch 40	6.00 LF	57	. 2	73	· -	131
		Not Incl Hangers or Fittings M MIL AA <15185 1011 > 6"D Pipe,1-1/2"Thk Fbgs Pipe Cvr		12	н	25	. 0	37
LABOR IN. BREWGA	M FOUTD ID. MINGEN	w/Fire Retardant Jackets						

LABOR ID: FRBK94 EQUIP ID: ALASKA

Currency in DOLLARS

CREW ID: FRBK94 UPB ID: ANCH94

RLYMS: Distributed Boilers - Fort Greely Utility Study Ft. Greely Utility Study (Distributed Boilers) U.S. Army Corps of Engineers 4. Bldg. 615 - Motor Pool PROJECT GRLYM5:

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DETAIL PAGE

LABOR EQUIPMNT TOTAL COST 529 64 92 70 800 305 91 165 83 84 65 183 118 332 38 20 40 100 131 145 109 64 85 36 50 30 0 0 3 N 13 0 0 0 Н 0 0 0 0 375 19 28 55 64 328 166 55 57 47 9 115 83 71 35 79 36 38 72 43 67 19 28 22 48 29 MANHRS 0 QUANTY UOM MATERIAL 64 5 137 35 109 26 37 67 260 49 14 28 ~ 102 42 57 44 14 30.00 LF 30.00 LF EA EA EA EA ΕA ΕŻ EA EA EA 20.00 LF 2.00 EA EA Ή EA EA ΕA ΕA 2.00 EA 2.00 EA 15.00 LF ΕÀ ΕA ΕA 1.00 2.00 3.00 1.00 4.00 10.00 2.00 2.00 5.00 2.00 4.00 3.00 1.00 5.00 2.00 1.00 1.00 30.00 1.00 -1 Y-Type, 250#(113kg) Screwed Ends H MIL AA <15125 2001 > 3/4"Float&Tstat Steam Trap,15PSI MIL AA <15061 1822 > 3/4" Union, 150# MI Black M MIL AA <15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L > 3.5"Diameter Dial Pressure Gauge Aluminum Case 0-300PSI M MIL AA <15122 1102 > 3/4"x3/4"Brz Press Rlf Vlv, Thrd MIL AA <15061 1635 > 1-1/2" 90 Deg Ell, 150# MI Black > 3/4"Thrd St Press Regul & Red, IB <15063 1023 > 3/4" Copper Tee - Straight Sweat AA <15063 1006 > 1-1/2"(40mm) Cu Pipe/Tubing Tp I AA <15185 1005 > 1-1/2"D Pipe,1"Thk Fib Pipe Cvr B MIL AA <15061 2388 > 6" Thread-O-Let, 300# Forge Stl Galv Dbl Wall Breech/Smoke Pipe Galv Dbl Wall Breech/Smoke Pipe M MIL AA <15855 1216 > 12"Rnd Flue/Vent Adj Roof Flash Galv Dbl Wall Breech/Smoke Pipe Galv Dbl Wall Breech/Smoke Pipe > 1" Threaded Ball Valve, CS Trim Sgl Seat, Sprg Load Dir Act Diap > 1"(25mm) Cu Pipe/Tubing Type L MIL AA <15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type MIL AA <15855 1186 > 12" Round Flue/Vent Pipe Tees AA <15122 1105 > 1-1/2" x 1-1/2" Brz PRV, Thrd M MIL AA <15104 1102 > 3/4" Thrd Ball Valve, CS Trim MIL AA <15855 1145 > 12"x 3' Round Flue/Vent Pipe 12" Round Flue/Vent Top Caps M MIL AA <15063 1043 > 3/4" 90 Degree Elbow, Copper <15063 1043 > 3/4" 90 Degree Elbow, Copper AA <15063 1044 > 1" 90 Degree Elbow, Copper Y-Type, 250#(113kg) Screwed MIL AA <15092 1201 > 2.07" ID Steel Pipe Sleeve M MIL AA <15083 1103 > 3/4" Strainer (Iron Body) 1822 > 3/4" Union, 150# MI Black Regular Port, Boiler Fill M MIL AA <15083 1103 > 3/4" Strainer (Iron Body) Regular Port, Flue Drain 20% added for 6" fitting w/Fire Retardant Jackets Boiler Relief Valves Boiler Relief Valve Ends, Boiler Fill Roof Pipe Boot Boiler Drain Boiler Drain Boiler Fill Boiler Fill Flue Drain Flue Drain Boiler Fill Boiler Fill Boiler Fill Boiler Fill M MIL AA <15855 1196 MIL AA <15121 1202 M MIL AA <15063 1004 M MIL AA <15080 3201 M MIL AA <15104 M MIL AA M MIL AA MIL MIL MIL MIL Σ Σ

UPB ID:

CREW ID: FRBK94

Currency in

QUIP ID: ALASKA

LABOR ID: FRBK94

U.S. Army Corps of Engineers
PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
4. Bldg. 615 - Motor Pool

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	QUANTY UOM MATERIAL	MATERIAL	MANHRS	LABOR EQUIPMNT	UI PMNT	TOTAL COST
M MIL AA <15720 2002 > Duplex Pump & Motor, 1 HP, 25GPM Cnds Pump w/CI Receiver, Float	1.00 EA	2,150	13	554	v	2,710
SW, Condensate Return Pumps M MIL AA <15061 1602 > 3/4"(20mm) A-53 Pipe, Sch 40 Not Incl Hangers or Fittings Condensate Deturn Dumne	40.00 LF	25	m	107	Ħ	134
M MIL AA <15185 1002 > 3/4 D Pipe, "Thk Fib Pipe Cover w/Fire Retardant Jackets	40.00 LF	36	3	102	1	139
MIL AA <15101 1104 > 3/4" Bronze 125# Gate Valve Threaded, Brazed or Soldered Condensate Return Pumps	2.00 EA	18	н	39	0	58
M MIL AA <15111 1105 > 3/4" Swing Check Valve Brz 125# for Thrd, Brazed or Soldered Inst., Condensate Return Pumps	1.00 EA	11	0	19	0	36
	1.00 EA	25	г	40	г	99
M CIV AA <02113 6011 > Rem 1/2" to 4" D Asb Pipe Insul Air-Cell Glove, Semi-Isolated	5.00 LF	20		22	6	44
CIV AA <02111 9202 > Demo Metal Pipe to 4"(10cm)D Cut piping for connection to	5.00 LF	0	0	19	0	19
M MIL AA <15061 1636 > 2" 90 Degree ELL,150# MI Black For connection to existing system	1.00 EA	7	.	22	0	25
TOTAL Steam Distribution Systems		4,861	86	3,912	51	8,824
TOTAL Distribution Systems		4,861	93	3,912	51	8,824
TOTAL HVAC		26,751	265	10,948	581	38,280
TOTAL Bldg. 615 - Motor Pool		26,751	265	10,948	581	38,280

Distributed Boilers - Fort Greely Utility Study Ft. Greely Utility Study (Distributed Boilers) U.S. Army Corps of Engineers 5. Bldg. 725 - School PROJECT GRLYM5:

TIME 11:51:38

DETAIL PAGE

TOTAL COST 280 105 80,131 80,131 80,131 1,507 382 83 LABOR EQUIPMNT 946 946 946 12,565 12,565 12,565 161 65 282 59 27 224 MANHRS 307 307 307 QUANTY UOM MATERIAL 66,620 1,281 66,620 66,620 117 40 97 23 2.00 EA 20.00 LF 20.00 LF EA LF 3.00 EA 00.9 1.00 125# Bronze Mtd w/Threaded Valve M USR AA <15624 1015 > 3150 MBH Oil Fired H2O Tube Blr M MIL AA <15185 1009 > 4"D Pipe,1" Thk Fbgs Pipe Cover Means Mechanical, increased for M MIL AA <15061 1639 > 4" 90 Degree Ell,150# MI Black M MIL AA <15061 1699 > 4" Tee, Red Out 150# MI Black M MIL AA <15061 1602 > 3/4"(20mm) A-53 Pipe, Sch 40 Ctrls. Price taken from 1996 M MIL AA <15101 1305 > 4" Iron Body Gate Valve, Thrd Not Incl Hangers or Fittings TOTAL Heating Generating Systems M MIL AA <15061 1609 > 4" (10cm) A-53 Pipe, Sch 40 Stl Shell w/Insul Jacket w/Fire Retardant Jackets would also include fittings and specialties and the flue stack. The unit of sleeves, and pipe insulation. The unit of measure at the assembly level is separators, pumps, heat exchangers, boiler feed units, etc. This assembly Assemblies include pipe and fitting, including supports, wall and floor This subsystem includes steam, hot water, furnace, and heater systems. Fuel Assemblies include boilers, expansion tanks, chemical feeders, air This includes systems that distribute heated and cooled air, ventilating TOTAL Steam Boilers Alaska costs and exhaust air, hot and chilled water, steam, and glycol heating. This system includes all equipment, distrbution systems, controls, and energy supply systems required by the heating, ventilating, and air include coal, oil, gas and electric unless otherwise noted measure at the assembly level is each. 5.09.04.02. Steam Distribution Systems 5.09.02. Heating Generating Systems 5.09.02.01. Steam Boilers 5.09.04. Distribution Systems conditioning system. 5. Bldg. 725 - School HVAC 5.09. 5.09. HVAC

Currency in Dq

CREW ID: FRBK94

35 58

25 39 39

73

ΕA

2.00

for Thrd, Brazed or Soldered Inst

3/4" Swing Check Valve Brz 125#

M MIL AA <15111 1105 >

Threaded, Brazed or Soldered

ΕA

2.00

10.00 LF

M MIL AA <15185 1002 > 3/4"D Pipe,1"Thk Fib Pipe Cover

w/Fire Retardant Jackets

M MIL AA <15101 1104 > 3/4" Bronze 125# Gate Valve

Not Incl Hangers or Fittings

33

0 0 0 0

9 6 18 33

10.00

UPB ID:

U.S. Army Corps of Engineers
PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
5. Bldg. 725 - School

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: : : : : : : : : : : : : : : : : : :	; ; ; ; ;	1		QUANTY UOM MATERIAL	:	MANHRS	LABOR EQUIPMNT	PMNT TOTAL	T COST
	, , , , , ,	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	\		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
	<15061		> 8" (20cm) Black Pipe, PE Sch40 A53	6.00 LF	46	7	96	9	148
M MIL AA	<15185	1012	. 8"D Pipe, 2" Thk Fbgs Pipe Cover	6.00 LF	38	1	32	0	70
R MII, AA	<15061	2388	W/Fire retainant Jackets > 8" Thread-O-Let. 300# Force Stl	3.00 EA	169	17	0.4	4	634
			Add 40% for 8" fitting) •	1) }) 1	,)
M MIL AA	<15083 1103		> 3/4" Strainer (Iron Body)	1.00 EA	44	0	19	0	64
			Y-Type, 250#(113kg) Screwed Ends						
MIL	<15125		> 3/4"Float&Tstat Steam Trap,15PSI		64	H	28	0	92
M MIL AA	<15061	1822 :	3/4" Union, 150# MI Black		ง	63	64	1	7.0
M MIL AA	<15855	1152 :	> 18"x 3' Round Flue/Vent Pipe	10.00 EA	1,340	11	456	4	1,800
			Galv Dbl Wall Breech/Smoke Pipe						
M MIL AA	<15855 1188		> 18" Round Flue/Vent Pipe Tees	2.00 EA	407	ø	231	7	641
			Galv Dbl Wall Breech/Smoke Pipe						
M MIL AA	<15855 1218		> 18"Rnd Flue/Vent Adj Roof Flash	2.00 EA	129	7	78	-	208
;					,	,	i		
M MIL AA	<15855 1198		> 18" Round Flue/Vent Top Caps	2.00 EA	332	0	78	н	411
M MIL AA	<15063 1004		> 1"(25mm) Cu Pipe/Tubing Type L	20.00 LF	56	H	57		83
			Flue Dra						:
M MIL AA	<15104 1103		> 1" Threaded Ball Valve, CS Trim	2.00 EA	37	H	47	0	84
			Regular Port, Flue Drain						
M MIL AA	<15063 1044		> 1" 90 Degree Elbow, Copper	5.00 EA	4	П	09	н	65
			Flue Drain						
M MIL AA			> 1-1/2"(40mm) Cu Pipe/Tubing Tp L		67	m	115	п	183
M MIL AA	<15185	1005	<pre>> 1-1/2"D Pipe,1"Thk Fib Pipe Cvr '-:</pre>	30.00 LF	34	7	83	- 1	118
					,	(:	,	6
M MIL AA	<15122	1105	> 1-1/2" X 1-1/2" Brz Pkv, Thrd	Z.00 EA	760	7	7.1	7	332
M MTT. AA	715061	1635	Soller Keller Valves	44 00 0	~	-	. 4	c	9.0
or or or	10001		I-1/2 30 Deg Ell, 130# MI Roiler Relief Valve		n	1	n n	Þ	0
M MIL AA	<15092	1201	> 2.07" ID Steel Pipe Sleeve	2.00 EA	49	8	47	m	131
					1	ı	•	ı	:
M MIL AA	<15063	1003	> 3/4"(20mm) Cu Pipe/Tubing Type L	15.00 LF	14	-	36	0	20
			Boiler Drain						
M MIL AA	<15063 1043		> 3/4" 90 Degree Elbow, Copper	4.00 EA	7	-	38	0	40
M MIL AA	<15063	1003	<pre>> 3/4"(20mm) Cu Pipe/Tubing Type L Boiler Fill</pre>	30.00 LF	28	7	72	.	100
M MIL AA	<15121	1202	> 3/4"Thrd St Press Regul & Red.IB	1.00 EA	102	-	43	c	145
					1	ŧ	2	,	•
			Boiler Fill						
M MIL AA	<15104	1102	> 3/4" Thrd Ball Valve, CS Trim	3.00 EA	42	2	67	-1	109
			Regular Port, Boiler Fill						
M MIL AA	<15083	1103		1.00 EA	44	0	19	0	64
			Y-Type, 250#(113kg) Screwed						
M MIL AA	<15080	3201	> 3.5"Diameter Dial Pressure Gauge	1.00 EA	57	7	28	0	85
			Boiler Fill						
M MIL AA	<15122 1102		> 3/4"x3/4"Brz Press Rlf Vlv, Thrd	1.00 EA	14	т	22	0	36
			Boiler Fill						

Currency in DOLLARS

CREW ID: FRBK94 UPB ID: ANCH94

U.S. Army Corps of Engineers GRLYM5: Distributed Boilers - Fort Greely Utility Study Ft. Greely Utility Study (Distributed Boilers) 5. Bldg. 725 - School PROJECT GRLYM5:

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LABOR EQUIPMNT TOTAL COST QUANTY UOM MATERIAL MANHRS

M MIL AA	<15063	1043 >	M MIL AA <15063 1043 > 3/4" 90 Degree Elbow, Copper Boiler Fill	5.00 EA	7	н	48	0	20
M MIL AA	<15063	1023	M MIL AA <15063 1023 > 3/4" Copper Tee - Straight Sweat Boiler Fill	2.00 EA	1	-	29	0	30
M MIL AA <15720 2002 >	<15720	2002	> Duplex Pump & Motor, 1 HP, 25GPM Cnds Pump w/CI Receiver, Float Sw, Condensate Return Pumps	1.00 EA	2,150	13	554	vo	2,710
M MIL AA	<15061	1602 >	M MIL AA <15061 1602 > 3/4"(20mm) A-53 Pipe, Sch 40 Not Incl Hangers or Fittings Condensate Return Pumps	40.00 LF	25	m	107		134
M MIL AA <15185 1002 >	<15185	1002	> 3/4"D Pipe,1"Thk Fib Pipe Cover w/Fire Retardant Jackets	40.00 LF	36	ю	102	1	139
M MIL AA <15101 1104	<15101		> 3/4" Bronze 125# Gate Valve Threaded, Brazed or Soldered Condensate Return Pumps	2.00 EA	18	н	39	0	28
M MIL AA	<15111	1105	M MIL AA <15111 1105 > 3/4" Swing Check Valve Brz 125# for Thrd, Brazed or Soldered Inst, Condensate Return Pumps	1.00 EA	17	0	19	0	36
M MIL AA <15092 1201	<15092	1201	> 2.07" ID Steel Pipe Sleeve Roof Pipe Boot	1.00 EA	25	н	40	П	99
M CIV AA <02113 6011	<02113		> Rem 1/2" to 4" D Asb Pipe Insul Air-Cell Glove, Semi-Isolated	5.00 LF	20	1	22	7	44
CIV AA	CIV AA <02111 9202 >	9202		S.00 LF	0	0	19	0	19
M MIL AA	<15061	1636	M MIL AA <15061 1636 > 2" 90 Degree ELL,150# MI Black For connection to existing system	1.00 EA	0	-	22	0	25

11,669 91,799 91,799

63

4,328 16,893 16,893

103 410

7,278

1,009 1,009

73,898 73,898

410

11,669

63

4,328

103

7,278

TOTAL Steam Distribution Systems

F1-18

TOTAL Distribution Systems

TOTAL Bldg. 725 - School

TOTAL HVAC

Currency in Dg

U.S. Army Corps of Engineers
PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
6. Bldg. 820 - Housing

TIME 11:51:38

DETAIL PAGE 16

6. Bidg. 173 - Housing 6. All mixed the problems and equipment, distribution systems controls, and fine conditions all equipment, distribution systems controls, and site of the conditions are supersectively systems. 6. Carlo Mixed and conditions from the conditions are supported by the seating womenting systems 6. Carlo Co. O. O. Stems Balling Systems 6. Carlo Co. O. O. Stems Balling and electric marcs offered to state of the conditions are the assembly from it is not. First include cond. Oil so and client condition in the condition of the conditions are the assembly from it is not. First include systems F	6.09. HVAC		QUANTY UOM MATERIAL	ATERIAL	MANHRS	LABOR EQUIPMNT	:	TOTAL COST
for this system includes all equipment, distribution systems, controls, and energy mapply systems required by the besting, variable and several systems. 6.93.02. Masking descention Systems 7.93.02. Masking Systems 7.93.02. Masking Systems 7.93.03. Masking Systems 7.93.03. Masking Systems 7.93.03. Masking Systems 7.93.04. Masking Systems 7.93.05. Masking Systems	בייייייייייייייייייייייייייייייייייייי		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1	 	1 1 1 1 1 1
6.09 CO. Heating Generating Systems Trible coal, oil, gas and stetric unites otherwise noted. This absoppion that contains the coller tend unite, etc. This assembly Assemblies include systems and stetric unites otherwise noted. Assemblies include systems Trible coal, oil, gas and stetric tunies otherwise noted. Will Ax cisca lose 1120 NBH Gill Wilmin lacket a CRIS TOTAL Meaning Systems 6.09.04.02. Bits the assembly level is each. Will Ax cisca lose and cooled air, ventilating and mover at the assembly level is seen that the cooled air, ventilating Assemblies include systems that distribute heated and cooled air, ventilating Assemblies include systems and spool hearing. Assemblies include were, seen of thirding supports, wall and floor Assemblies include were, seen of thirding supports, wall and floor Assemblies include systems WILL Ax cisca lose 3 of the page (0.00 LP 77 3 139 11 2 2 0 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 1 2 1 1 1 2 1	0.9	. HVAC This system includes all equipment, energy supply systems required by t conditioning system.						
6.09.02.01. Seem Politor weakening beliave, expansion tasks chemical feeders, sir wend and any and specialties and the flue steet. This seemally would also include fittings and specialties and the flue steet. The unit of measure at the assembly level is seci. TOTAL Ream Bollers FORTAL Ream Boller		6.09.02. Heating Generating Systems This subsystem includes steam, hot water, furnace, and heater systems. Fuel include coal, oil, gas and electric unless otherwise noted.						
# Will AM < 15524 1008 > 1120 MBH Oll Fired NEO Tube Bir		6.09.02.01. Steam Boilers Assemblies include boilers, expansion tanks, chemical feeders, air separators, pumps, heat exchangers, boiler feed units, etc. This assembly would also include fittings and specialties and the flue stack. The unit of						
TOTAL Reating Generating Systems 6.09.04. Distribution Systems This includes systems that distribute heated and cooled air, ventilating and exhaust air, hot and chilled water, steam, and glycol heating. This includes systems that distribute heated and cooled air, ventilating and exhaust air, hot and chilled water, steam, and glycol heating. This includes systems that distribute heated and cooled air, ventilating supports, wall and floor sleeves, and pipe insulation. The unit of measure at the assembly level is not likely and pipe insulation. The unit of measure at the assembly level is solved by the second of the state of the second sleeves, and pipe insulation. The unit of measure at the assembly level is solved by the second of the state of the second sleeves, and pipe insulation and state of the second sleeves, and pipe insulation and state of the second sleeves, and pipe insulation and state of the second sleeves, and pipe insulation and state of second sleeves. MILLAA - closis loss - 100		<pre><15624 1008 > 1120 MBH Oil Fired H2O Tube Stl Shell w/Insul Jacket &</pre>	2.00 EA	21,890	172	7,036	530	29,456
6.09.04. Distribution Systems This includes systems that distribute heated and cooled air ventilating and exhaust air, hot and chilled water; steam and glycol heating. 6.09.04. Distribution Systems And exhaust air, hot and chilled water; steam and glycol heating. 6.09.04.02. Steam bill stribution Systems And chilled water; steam and glycol heating. Not Incl Hangers or Fittings MILLAA (1506) 1060 > 3"(80mm) A-23 pipe, ScH 0 Not Incl Hangers or Fittings MILLAA (1516) 1040 > 3" (150mm) A-23 pipe, ScH 0 Not Incl Hangers or Fittings MILLAA (1516) 1104 > 3" (150mm) A-23 pipe, ScH 0 M	F		•	21,890	172	7,036	530	29,456
that distribute heated and cooled air, ventilating and chilled water, steam, and glycol heating. Lation Systems And chilled water, steam, and glycol heating. Lation Systems MIL AA <15061 1608 > 3" (80mm) A-53 Pipe, Sch 40 MIL AA <15061 1080 > 3" (80mm) A-53 Pipe, Sch 40 MIL AA <15101 304 > 3" (80mm) A-53 Pipe, Sch 40 MIL AA <15101 304 > 3" (80mm) A-53 Pipe, Sch 40 MIL AA <15101 304 > 3" (80mm) A-53 Pipe, Sch 40 MIL AA <15101 304 > 3" (80mm) A-53 Pipe, Sch 40 MIL AA <15061 1698 > 3" (80mm) A-53 Pipe, Sch 40 MIL AA <15061 1698 > 3" Tee, Red out 150# MI Black MIL AA <15061 1602 > 34" (20mm) A-53 Pipe, Sch 40 MIL AA <15101 304 > 34" Exprase or Fittings MIL AA <15101 304 > 34" Exprase or Fittings MIL AA <15101 305 > 34" Bronze 125# Gate Valve MIL AA <15101 305 > 34" Bronze 125# Gate Valve MIL AA <15101 305 > 34" Bronze 125# Gate Valve MIL AA <15101 305 > 34" Bronze 125# Gate Valve MIL AA <15101 305 > 34" Bronze 125# Gate Valve MIL AA <15101 305 > 34" Bronze 125# Gate Valve MIL AA <15101 305 > 34" Bronze 125# Gate Valve MIL AA <15101 305 > 34" Bronze 125# Gate Valve MIL AA <15101 305 > 34" Bronze 125# Gate Valve MIL AA <15101 305 > 34" Bronze 125# Gate Valve MIL AA <15101 305 > 34" Bronze 125# Gate Valve MIL AA <15101 305 > 34" Bronze 125# Gate Valve MIL AA <15101 305 > 34" Bronze 125# Gate Valve MIL AA <15101 305 > 34" Bronze 125# Gate Valve MIL AA <15101 305 > 34" Bronze 125# Gate Valve MIL AA <1501 301 > 6" 15PPP - 17" 2" Thk Ppg Pipe CVT MIL AA <1505 1 35	1-19	TOTAL Heating Generating Systems	•	21,890	172	7,036	530	29,456
### MIL AA <15161 1608 > 3" (80mm) A-53 Pipe, Sch 40 #### MIL AA <15165 1608 > 3" (80mm) A-53 Pipe, Sch 40 ##### MIL AA <15161 1608 > 3" (80mm) A-53 Pipe, Sch 40 ###################################		that distribute heated and cooled air, and chilled water, steam, and glycol hes						
MIL AA <15185 1008 > 3"(80mm) A-53 Pipe, Sch 40 MIL AA <15185 1008 > 3"D Pipe,1" Thk Pbgs Pipe Cover 20.00 LF 31 2 60 1 W/File Retardant Jackets MIL AA <15101 1304 > 3" Iron Body Gate Valve, Third 3.00 EA 476 5 206 2 6 MIL AA <1501 1304 > 3" Iron Body Gate Valve, Third 3.00 EA 46 6 263 2 6 MIL AA <1501 1628 > 3" Po Pipe,1"Thk Pipe Bipe, Sch 40 10.00 LF 6 12 5 2 6 6 MIL AA <15061 1629 > 34" (20mm) A-53 Pipe, Sch 40 10.00 LF 6 1 27 0 MIL AA <15185 1002 > 34" (20mm) A-53 Pipe, Sch 40 10.00 LF 6 1 27 0 MIL AA <15185 1002 > 34" (20mm) A-53 Pipe, Sch 40 10.00 LF 9 1 27 0 MIL AA <1511 1105 > 34" Swing Check Valve Brz 125# 2.00 EA 33 1 39 0 MIL AA <1511 1105 > 34" Swing Check Valve Brz 125# 2.00 EA 33 1 39 0 MIL AA <1511 1105 > 34" Swing Check Valve Brz 125# 2.00 EA 33 1 39 0 MIL AA <1511 1105 > 34" Swing Check Valve Brz 125# 2.00 EA 33 1 39 0 MIL AA <1511 1105 > 4"(15cm) A-53 Pipe, Sch 40 6.00 LF 57 2 73 1 1 1 MIL AA <15185 1011 > 6"D Pipe,1-1.12"Thk Pbgs Pipe Cvr 6.00 LF 12 12 12 25 0		fitting, including supports, wall and . The unit of measure at the assembly						
Not Incl Hangers or Fittings		M MIL AA <15061 1608 >	20.00 LF	77	Э	139	ı	217
4/Fire Retardant Jackets 4/Fire Retardant Jackets 4/Fire Retardant Jackets 125# Bronze Mcd W/Threaded Valve 1.00 EA 46 6 26 6 415661 1638 > 3" Tee, Red Out 150# MI Black 6.00 EA 46 6 263 2 3 41561 1602 > 3/4" (20mm) A-53 Pipe, Sch 40 10.00 LF 6 1 27 0 41561 1602 > 3/4" (20mm) A-53 Pipe, Sch 40 10.00 LF 6 1 27 0 41561 1602 > 3/4" (20mm) A-53 Pipe, Sch 40 10.00 LF 9 1 25 0 41561 1104 > 3/4" Bronze 125# Gate Valve 2.00 EA 18 1 39 0 41511 1105 > 3/4" Swing Check Valve Brz 125# 2.00 EA 33 1 39 0 41511 1105 > 3/4" Swing Check Valve Brz 125# 2.00 EA 33 1 39 0 41511 1105 > 6" (15cm) A-53 Pipe, Sch 40 6.00 LF 57 2 73 1 1 41516 1101 > 6"D Pipe, 1-1/2"Thk Fbgs Pipe Cvr 6.00 LF 12 12 12 0 0		<15185 1008 >		31	2	09	1	92
1284 Bronze Mtd W/Threaded Valve 6.00 EA 46 6 263 2 2		7		476	ď	206	~	684
<pre><15061 1638 > 3" 90 Degree Ell,150# MI Black 6.00 EA 46 6 263 2 3 3 </pre> <pre><15061 1698 > 3" Tee, Red Out 150# MI Black 1.00 EA 12 1 52 0 <15061 1602 > 3/4"(20mm) A-53 Pipe, Sch 40 10.00 LF 6 1 27 0 </pre> <pre><15061 1602 > 3/4"(20mm) A-53 Pipe, Sch 40 10.00 LF 6 1 27 0 </pre> <pre><15185 1002 > 3/4"D Pipe,1"Thk Fib Pipe Cover 10.00 LF 9 1 25 0 </pre> <pre><15185 1002 > 3/4" Bronze 125# Gate Valve 2.00 EA 18 1 39 0 </pre> <pre><15101 1104 > 3/4" Swing Check Valve Brz 125# 2.00 EA 33 1 39 0 </pre> <pre><15111 1105 > 3/4" Swing Check Valve Brz 125# 2.00 EA 33 1 39 0 </pre> <pre><15061 1612 > 6"(15cm) A-53 Pipe, Sch 40 6.00 LF 57 2 73 1 1 1 </pre> <pre><15161 1110 > 6"D Pipe,1-1/2"Thk Fbgs Pipe Cov 6.00 LF 12 12 12 12 12 12 12 12 12 12 12 12 12</pre>		< #051 10161>		•	n	2	ı	•
<pre><15061 1698 > 3" Tee, Ked OUT 150# MI Black</pre>		<15061 1638 >	6.00 EA	46	φ.	263	0, 0	311
Not Incl Hangers or Fittings -15185 1002 > 3/4"D Pipe,1"Thk Fib Pipe Cover 10.00 LF 9 1 25 0 w/Fire Retardant Jackets -15101 1104 > 3/4" Bronze 125# Gate Valve Threaded, Brazed or Soldered -15111 1105 > 3/4" Swing Check Valve Brz 125# 2.00 EA 33 1 39 0 -15061 1612 > 6"(15cm) A-53 Pipe, Sch 40 6.00 LF 57 2 73 1 1 -15185 1011 > 6"D Pipe,1-1/2"Thk Fbgs Pipe Cvr 6.00 LF 12 1 25 0		<15061 1698 > <15061 1602 >		9	4 -4	27	0	33
<pre>c15183 1002 > yFr Pripe Tink Fiber Cover</pre>		Not Incl Hangers		o		25	c	3.5
<pre><15101 1104 > 3/4" Bronze 125# Gate Valve</pre>		<pre><15185 1002 > 3/4"D ripe, i"ink w/Fire Retardant</pre>		`	1	2	,	
<pre><15111 1105 > 3/4 Swing Check Valve Brz 125# 2.00 EA 33 1 39 0 for Thrd, Brazed or Soldered Inst <15061 1612 > 6"(15cm) A-53 Pipe, Sch 40 Not Incl Hangers or Fittings <15185 1011 > 6"D Pipe, 1-1/2"Thk Fbgs Pipe Cvr 6.00 LF 12 1 25 0</pre>		<15101 1104 >		18	1	39	0	28
cor intd, Brazed of Soldered inst c15061 1612 > 6"(15cm) A-53 Pipe, Sch 40 6.00 LF 57 2 73 1 1 Not Incl Hangers or Fittings c15185 1011 > 6"D Pipe,1-1/2"Thk Fbgs Pipe Cvr 6.00 LF 12 1 25 0		<15111 1105 >		33	1	39	0	73
Not Incl Hangers or Fittings 12 1 25 0 15185 1011 5 10 10 10 10 10		<15061 1612 >	6.00 LF	57	7	73	г	131
		<15185 1011 >	6.00 LF	12		25	0	3.

LABOR ID: FRBK94 EC

Currency in DOLLARS

CREW ID: FRBK94 UPB ID: ANCH94

U.S. Army Corps of Engineers
PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
6. Bldg. 820 - Housing

TIME 11:51:38

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DETAIL PAGE

			QUANTY	QUANTY UOM MATERIAL	MANHRS	LABOR EQUIPMNT	1	TOTAL COST
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		. 1			1 1 1 1 1 1 1 1		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
B MIL AA <15061	2388	> 6" Thread-O-Let, 300# Forge Stl Add 20% for 6" fitting	3.00	EA 140	6	375	13	529
M MIL AA <15083 1103		> 3/4" Strainer (Iron Body)	1.00	EA 44	0	19	0	64
SCIENT AN ITAM	1000		•	i	,			
MIL AM	1822	> 3/4" rloatwistat Steam Trap, 15PSI	1.00	EA 6		28	0	92
MIL AA	1142	10"x 3' Round Flue/Vent Dine		EA EA	7 1	64	., t	70
		Galv Dbl Wall Breech/Smoke Pipe	70.01		•	304	n	645
M MIL AA <15855	1185 >		2.00	EA 115	æ	137	H	253
	101	Galv Dbl Wall Breech,	,					
שייים אישי יידוש שי	< 6171	Galtr Dhi wall Brooch /cmole Pinsh	2.00	EA 27	Ħ	44	0	72
M MIL AA <15855 1195	1195 >		2.00	EA 77	•	44	c	122
		Galv Dbl Wall Breech/Smoke Pipe) - -		•	;	•	777
M MIL AA <15063	1004 >		20.00	LF 26	1	57	1	83
M MTT. 88 /15104	1103	Flue Drain	ć		,	!		
110	× 5011		2.00	EA 37	-1	47	0	84
M MIL AA <15063 1044	1044 >		5.00	EA 4	-	9	•	ע
		Flue Drain			•)	•	ò
MIL AA			30.00	LF 67	e	115	1	183
M MIL AA <15185	1005 >	> 1-1/2"D Pipe,1"Thk Fib Pipe Cvr	30.00	LF 34	7	83	1	118
;	,							
M MIL AA <15122	1105 >	1-1/2" x 1-1/2" Brz PRV, Thrd	2.00	EA 260	2	71	-	332
M MTT, AA <15061	1635		ć	r E	,	Ĺ	ć	
10001			7.00		Н	35	0	38
M MIL AA <15092	1201 >	2.07" ID Steel	2.00	EA 49	8	42	~	131
		Roof Pipe Boot			1)	1
M MIL AA <15063 1003	1003 >	. 3/4"(20mm) Cu Pipe/Tubing Type L	15.00	LF 14	Т	36	0	20
M MIL AA <15063	1043 >	Boller Drain 3/4" 90 Degree Elbow. Copper	00	4	-	0,0	c	•
			•	4	4	00	>	0
M MIL AA <15063	1003 >		30.00	LF 28	8	72	- -1	100
		Boiler Fill						
M MIL AA <15121	1202 >		1.00	EA 102	1	43	0	145
		<pre>Sg1 Seat, Sprg Load Dir Act Diap Boiler Fill</pre>						
M MIL AA <15104	1102 >		3.00	EA 42	2	67		109
		Regular Port,						
M MIL AA <15083	1103 >	3/4" Strainer (Iron	1.00	EA 44	0	19	0	64
		Y-Type, 250#(113kg) Screwed Ends, Boiler Fill						
M MIL AA <15080 3201	3201 >		1.00	EA 57	ı	28	0	85
		ise 0-300PSI						
COTTON NA TEN M		Boiler Fill						
HTLL WA	1102 >	3/4"x3/4"Brz Fress Kir VIV, Thrd Boiler Fill	1.00	EA 14	H	22	0	36
M MIL AA <15063	1043 >		5.00	EA 2	Н	48	0	0.5
		Boiler Fill						;
M MIL AA <15063 1023	1023 >	3/4" Copper Tee - Straight Sweat Boiler Fill	2.00	EA 1	-1	29	0	30

Currency in Dd

CREW ID: FRBK94 UPB ID:

QUIP ID: ALASKA

LABOR ID: FRBK94

Currency in DOLLARS

CREW ID: FRBK94 UPB ID: ANCH94

EQUIP ID: ALASKA LABOR ID: FRBK94

U.S. Army Corps of Engineers
PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
6. Bldg. 820 - Housing

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	QUANTY UOM MATERIAL	MATERIAL	MANHRS	LABOR EQUIPMNT	UIPMNT	TOTAL COST
		1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	; ! ! !	
M MIL AA <15720 2002 > Duplex Pump & Motor, 1 HP, 25GPM Chds Pump W/CI Receiver, Float	PM 1.00 EA	2,150	13	554	9	2,710
Sw, Condensate Return Pumps M MIL AA <15061 1602 > 3/4"(20mm) A-53 Pipe, Sch 40 Not Incl Hangers or Fittings	40.00 LF	25	m	107	H	134
Condensate Return Dumps M MIL AA <15185 1002 > 3/4"D Pipe,1"Thk Fib Pipe Cover	r 40.00 LF	36	m	102	1	139
M MIL AA <15101 1104 > 3/4" Bronze 125# Gate Valve Threaded, Brazed or Soldered	2.00 EA	18	႕	39	0	58
Condensace Keturn Fumps MIL AA <15111 1105 > 3/4" Swing Check Valve Brz 125# for Thrd, Brazed or Soldered	# 1.00 EA	1.7	0	19	0	36
M MIL AA <15092 1201 > 2.07 ID Steel Pipe Sleeve Roof Pipe Boot	1.00 EA	25	Ħ	40	П	99
M CIV AA <02113 6011 > Ren 1,72 to 4" D Asb Pipe Insul airer 21 olove. Semi-Isolated	1 5.00 LF	20	н	22	73	44
CIV AA <02111 9202 > Demo Metal Pipe to 4" (10cm)D Cut piping for connection to conting enterent (8)	5.00 LF	0	0	19		19
M MIL AA <15061 1636 > 2" 90 Degree ELL,150# MI Black For connection to existing system	1.00 EA	8	H	22	0	
TOTAL Steam Distribution Systems		4,667	91	3,838	20	8,555
TOTAL Distribution Systems		4,667	91	3,838	50	8,555
TOTAL HVAC		26,557	263	10,874	580	38,011
TOTAL Bldg. 820 - Housing		26,557	263	10,874	580	38,011

Mon 18 Mar 1996 Eff. Date 03/18/06 DETAILED ESTIMATE

SRLYMS: Distributed Boilers - Fort Greely Utility Study
Pt. Greely Utility Study (Distributed Boilers) U.S. Army Corps of Engineers 7. Bldg. 821 - Housing PROJECT GRLYMS:

TIME 11:51:38

DETAIL PAGE

LABOR EQUIPMNT TOTAL COST 217 92 29,456 29,456 29,456 684 311 64 33 530 530 530 0 12 0 7,036 7,036 7,036 139 9 206 263 52 QUANTY UOM MATERIAL MANHRS 172 172 172 21,890 21,890 21,890 9 77 476 46 12 2.00 EA 20.00 LF 占 ΕÀ EA EA LF 00.9 1.00 20.00 3.00 10.00 Stl Shell w/Insul Jacket & Ctrls 125# Bronze Mtd w/Threaded Valve M MIL AA <15624 1008 > 1120 MBH Oil Fired H20 Tube Blr M MIL AA <15185 1008 > 3"D Pipe,1" Thk Fbgs Pipe Cover Not Incl Hangers or Fittings M MIL AA <15185 1002 > 3/4"D Pipe,1"Thk Fib Pipe Cover M MIL AA <15061 1638 > 3" 90 Degree Ell,150# MI Black M MIL AA <15061 1698 > 3" Tee, Red Out 150# MI Black M MIL AA <15101 1304 > 3" Iron Body Gate Valve, Thrd Not Incl Hangers or Fittings M MIL AA <15061 1602 > 3/4"(20mm) A-53 Pipe, Sch 40 TOTAL Heating Generating Systems M MIL AA <15061 1608 > 3"(80mm) A-53 Pipe, Sch 40 w/Fire Retardant Jackets would also include fittings and specialties and the flue stack. The unit of Assemblies include pipe and fitting, including supports, wall and floor sleeves, and pipe insulation. The unit of measure at the assembly level is separators, pumps, heat exchangers, boiler feed units, etc. This assembly This subsystem includes steam, hot water, furnace, and heater systems. Fuel Assemblies include boilers, expansion tanks, chemical feeders, air TOTAL Steam Boilers This includes systems that distribute heated and cooled air, ventilating and exhaust air, hot and chilled water, steam, and glycol heating This system includes all equipment, distrbution systems, controls, and energy supply systems required by the heating, ventilating, and air include coal, oil, gas and electric unless otherwise noted. measure at the assembly level is each. 7.09.04.02. Steam Distribution Systems 7.09.02. Heating Generating Systems 7.09.02.01. Steam Boilers 7.09.04. Distribution Systems conditioning system. 7. Bldg. 821 - Housing 7.09. HVAC 7.09. HVAC

F1-22

LABOR ID: FRBK94

QUIP ID: ALASKA

Currency in DOI

M MIL AA <15185 1011 > 6"D Pipe,1-1/2"Thk Fbgs Pipe Cvr

w/Fire Retardant Jackets

<15061 1612 > 6"(15cm) A-53 Pipe, Sch 40 Not Incl Hangers or Fittings

UPB ID: CREW ID: PRBK94

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N

35 28

0 0 0

25 39 39 73 25

σ

Ľ ΕA EA 6.00 LF 6.00 LF

10.00

18 33 57 12

2.00

2.00

for Thrd, Brazed or Soldered Inst

<15111 1105 > 3/4" Swing Check Valve Brz 125#

M MIL AA M MIL AA

Threaded, Brazed or Soldered

M MIL AA <15101 1104 > 3/4" Bronze 125# Gate Valve

w/Fire Retardant Jackets

73 131 37

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U.S. Army Corps of Engineers
PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
7. Bldg. 821 - Housing

TIME 11:51:38

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PAGE
DETAIL

	QUANTY UOM MATERIAL	:	MANHRS	LABOR EQU	EQUIPMNT TOTAL	AL COST
		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	† ; ;
B MIL AA <15061 2388 > 6" Thread-O-Let, 300# Forge Stl	3.00 EA	140	6	375	13	529
20% added for 6" Ilting M MIL AA <15083 1103 > 3/4" Strainer (Iron Body)	1.00 EA	44	0	19	0	64
1000 UC 1100 MM A A A A A A A A A A A A A A A A A	43 00 1	44	-	28	0	92
M MIL AA <15123 2001 > 3/4 Floatæistat Steam (15/15/5) W MTT DA <15061 1822 > 3/4" Union, 150# MI Black		; ហ	1 73	64	. 	7.0
MIL AA <15855 1142 >	10.00 EA	338	7	304	æ	645
		L T	,			753
M MIL AA <15855 1185 > 10" Round Flue/Vent Pipe Tees	2.00 EA	115	m	137	-	253
M MIL AA <15855 1215 > 10"Rnd Flue/Vent Adj Roof Flash	2.00 EA	27	1	44	0	72
		1	-	*	c	122
M MIL AA <15855 1195 > 10" Round Flue/Vent Top Caps	2.00 EA	2	-	4 4	>	771
M MIL AA <15063 1004 > 1" (25mm) Cu Pipe/Tubing Type L	20.00 LF	26	7	57	m	83
Fine Drain M MIL AA <15104 1103 > 1" Threaded Ball Valve, CS Trim	2.00 EA	37	1	47	0	84
Regular Port, Flue Drain M MII. AA <15063 1044 > 1" 90 Degree Elbow, Copper	5.00 EA	4	н	09	г	65
M MIL AA <15063 1006 > 1-1/2"(40mm) Cu Pipe/Tubing Tp L	30.00 LF	34	m ~	115 83	н н	183
Min AA KISI83 1003 / 1-1/2 D Fige, I in the life w/Fire Retardant Jackets		! }				;
M MIL AA <15122 1105 > 1-1/2" x 1-1/2" Brz PRV, Thrd	2.00 EA	260	7	71	-	332
M MIL AA <15061 1635 > 1-1/2" 90 Deg Ell, 150# MI Black	2.00 EA	æ	1	35	0	38
Boiler Relief Valve	2.00 EA	49	8	79	м	131
M MIL AA <15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L	15.00 LF	14	-	36	0	20
M MIL AA <15063 1043 > 3/4" 90 Degree Elbow, Copper	4.00 EA		1	38	0	40
Boiler Drain warr as JEGG 1003 > 2/4"/20mm) Cu Dine/Unihing Type L	30.00 LF	28	8	72	-	100
WILL AM CISUBS IVUS		}				
M MIL AA <15121 1202 > 3/4"Thrd St Press Regul & Red,IB Sg1 Sear,Sprg Load Dir Act Diap	1.00 EA	102		43	0	145
M MIT, AA <15104 1102 > 3/4" Thrd Ball Valve, CS Trim	3.00 EA	42	8	67	П	109
		;	•	,	ć	;
M MIL AA <15083 1103 > 3/4" Strainer (Iron Body) Y-Tvne. 250#(113kg) Screwed	1.00 EA	44	0	19	-	4
Ends, Boiler Fill						
M MIL AA <15080 3201 > 3.5"Diameter Dial Pressure Gauge Aluminum case 0-300PSI DANIOR ESTIT	1.00 EA	57	-	88	0	S S
M MIL AA <15122 1102 > 3/4 x 2/1 Brz Press Rlf Vlv, Thrd	1.00 EA	14	7	22	0	36
M MIL AA <15063 1043 > 3/4" 90 Degree Elbow, Copper	5.00 EA	73	7	48	0	5.0
M MIL AA <15063 1023 > 3/4" Copper Tee - Straight Sweat Roiler Fill	2.00 EA	1	1	29	0	30
					i	

Currency in DOLLARS

CREW ID: FRBK94 UPB ID: ANCH94

LABOR ID: FRBK94 EQUIP ID: ALASKA

U.S. Army Corps of Engineers
PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
7. Bldg. 821 - Housing

TIME 11:51:38

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DETAIL PAGE

1	QUANTY UOM MATERIAL	MATERIAL	MANHRS	LABOR E(LABOR EQUIPMNT	TOTAL COST
M MIL AA <15720 2002 > Duplex Pump & Motor, 1 HP, 25GPM Cnds Pump w/CI Receiver,Float	1.00 EA	2,150	13	554	9	2,710
Sw, Condensate Return Pumps M MIL AA <15061 1602 > 3/4"(20mm) A-53 Pipe, Sch 40 Not Incl Hangers or Fittings	40.00 LF	25	м	107	1	134
Condensate Return Pumps M MIL AA <15185 1002 > 3/4"D Pipe,1"The Fib Pipe Cover	40.00 LF	36	m	102	т	139
W/Fire Retardant Jackets M MIL AA <15101 1104 > 3/4" Bronze 125# Gate Valve Threaded,Brazed or Soldered	2.00 EA	18	ਜ	39	0	28
Condensate Return Pumps M MIL AA <15111 1105 > 3/4" Swing Check Valve Brz 125# for Thrd,Brazed or Soldered	1.00 EA	17	0	19	0	36
Inst, Condensate Return Pumps M MIL AA <15092 1201 > 2.07" ID Steel Pipe Sleeve	1.00 EA	25	1	40	н	99
M CIV AA <02113 6011 > Rem 1/2" to 4" D Asb Pipe Insul	5.00 LF	20	1	22	73	44
Alr-Cell Glove, Semi-180lated CIV AA <02111 9202 > Demo Metal Pipe to 4"(10cm)D Cut piping for connection to	5.00 LF	0	0	19	0	19
existing system (8). M MIL AA <15061 1636 > 2" 90 Degree ELL,150# MI Black For connection to existing system	1.00 EA	0	н	22	0	25
TOTAL Steam Distribution Systems		4,667	91	3,838	50	8,555
TOTAL Distribution Systems		4,667	91	3,838	50	8,555
TOTAL HVAC		26,557	263	10,874	580	38,011
TOTAL Bldg. 821 - Housing		26,557	263	10,874	580	38,011

Mon 18 Mar 1996 Eff. Date 03/18/06 DETAILED ESTIMATE

U.S. Army Corps of Engineers
PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
8. Bldg. 606 - Central Heating Plt

22 DETAIL PAGE

8.09 GC Control Heating Pit was greated the protection, and any controls, and any controls, and any option include soil spin greated the protection of the	8.09. HVAC	O	QUANTY UOM MATERIAL	:	MANHRS	LABOR EQUIPMNT	- :	TOTAL COST
Associated all equipment, distribution systems, controls, and air conditioning systems required by the heating, vanitiating, and air conditioning systems required by the heating, vanitiating, and air conditioning systems as 0.0.12 Meaning Systems and electric unless otherwise model. 8.0.0.12 Meaning Systems by Systems and electric unless otherwise model. 8.0.0.12 Meaning Systems that should be presented by the heating systems and secritic unless otherwise model. 8.0.0.12 Meaning Systems that the mannershy Level is each. This answelly would also include filtrings and specialise and the flue stock. The unit of mannershy Level is each. The unit of the unit of the unit of the unit of the unit of the unit of the unit of the unit of the unit of mannershy Level is each. The unit of the unit o	8. Bldg.	606 - Central Heating Plt						
Total Marker, furnace, and heater systems. Puel	8.05	system includes all equipment, distrbution systems, controls, yy supply systems required by the heating, ventilating, and ai itioning system.						
### 8-09-02-10; Steam Boileas: expansion tanks, chemical feeders, air sequences and prize feed units, etc. This assembly expension transcendises include Doilease feed units, etc. This assembly expension that the sequence has carbonagers below the first each. #### PUTAL Steam Boileas #### PUTAL Steam Boileas #### PUTAL Steam Boileas #### PUTAL Reating Generating Systems ##### #############################		8.09.02. Heating Generating Systems This subsystem includes steam, hot water, furnace, and heater systems. Fuel include coal, oil, gas and electric unless otherwise noted.						
# Mil. AA <15624 1012 > 1960 MBH Oll Fired HOO Thee Blr		ude boilers, expansion ta ps, heat exchangers, boil ude fittings and specialt						
### TOTAL Heating Generating Systems #### TOTAL Heating Generating Systems ###################################		<15624 1012 >	2.00 EA	32,031	265	10,825	815	43,671
8.09.04. Distribution Systems Tris includes systems that distribute heated and cooled air, ventilating and exhaust air, hot and chilled water, steam, and glycol heating. 8.09.04.02. Steam Distribution Systems 8.09.04.02. Steam Distribution Systems 8.09.04.02. Steam Distribution Systems Null AA <15061 1608 > 3*(80mm) A-53 Pipe, SAH 40 Null AA <15061 1608 > 3*(80mm) A-53 Pipe, SAH 40 Null AA <15061 1034 > 3*(80mm) A-53 Pipe, SAH 40 Null AA <15061 1034 > 3*(80mm) A-53 Pipe, SAH 40 Null AA <15061 1034 > 3*(80mm) A-53 Pipe, SAH 40 Null AA <15061 1034 > 3*(80mm) A-53 Pipe, SAH 40 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Hander SAH 46 Null AA <15061 1038 > 3*0 Pipel Pipel Pipel Pipel SAH 40 Null AA <15061 1032 > 3*0 Pipel Pipel Pipel SAH 40 Null AA <15061 1032 > 3*0 Pipel Pipel Pipel SAH 40 Null AA <15061 1032 > 3*0 Pipel Pipel Pipel SAH 40 Null AA <15061 1032 > 3*0 Pipel	ī		•	32,031	265	10,825	815	43,671
### distribute heated and cooled air, ventilating #### distribute heated and cooled air, ventilating ###################################	21_95	TOTAL Heating Generating Systems	,	32,031	265	10,825	815	43,671
### Hill AA <15061 1608 > 3" (800mm) A-53 Pipe, Sch 40 ### MILL AA <15061 1608 > 3" (800mm) A-53 Pipe, Sch 40 ### MILL AA <15061 1608 > 3" (800mm) A-53 Pipe, Sch 40 ### MILL AA <15061 1608 > 3" (800mm) A-53 Pipe, Sch 40 ### MILL AA <15061 1638 > 3" Iron Body Gate Valve, Thrd ### MILL AA <15061 1638 > 3" Iron Body Gate Valve, Thrd ### MILL AA <15061 1638 > 3" Iron Body Gate Valve, Thrd ### MILL AA <15061 1638 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1638 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1638 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1638 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1638 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1638 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1638 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1638 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1638 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black ### MILL AA <15061 1822 > 3" Tee, Red Out 150# MI Black		that distribute heated and chilled water, steam						
MIL AA <15061 1608 > 3"(80mm) A-53 Pipe, Sch 40 Not Incl Hangers or Fittings MIL AA <15185 1008 > 3"0 Pipe, "Thr Pugs Pipe Cover 20.00 LF 31 2 60 W/Fire Retardant Jackers 20.00 LF 31 2 60 MIL AA <15101 1304 > 3" Iron Body Gate Valve, Thrd 3.00 EA 476 5 206 MIL AA <15061 1638 > 3" Tee, Red Out 150# MI Black 6.00 EA 46 6 263 MIL AA <15061 1612 > 6"(15cm) A-53 Pipe, Sch 40 6.00 LF 57 2 73 MIL AA <15061 1612 > 6"(15cm) A-53 Pipe, Sch 40 6.00 LF 57 2 73 MIL AA <15061 1612 > 6"(15cm) A-53 Pipe, Sch 40 6.00 LF 57 2 73 MIL AA <15061 2388 > 6" Thread-o-bet, 300# Forge Stl 3.00 EA 140 9 375 1 MIL AA <15081 2388 > 6" Thread-o-bet, 300# Forge Stl 3.00 EA 44 0 19 W/Fire Retardant Jackers MIL AA <15083 1103 > 3/4" Entainer (Iron Body) W/Type, 250# [11389] Screwed Ends MIL AA <15125 2001 > 3/4"Piloat&Tstat Steam Trap,15PSI 1.00 EA 5 5 64 MIL AA <15061 1822 > 3/4" Union, 150# MI Black MIL AA <15185 1002 > 3/4" Union, 150# MI Black MIL AA <15185 1002 > 3/4" Union, 150# WI Pipe cover 10.00 LF 9 1 25		fitting, including supports, wall and floor . The unit of measure at the assembly level						
Not Incl Hangers or Fittings (15185 1008 > 3"D Pipe,1" Thrk Pdgs Pipe Cover 20.00 LF 31 2 60 (15101 1304 > 3" Iron Body Gate Valve, Thrd 3.00 EA 476 5 206 (15501 1638 > 3" 90 Degree Ell,150# MI Black 1.00 EA 12 1 52 (15501 1638 > 3" 90 Degree Ell,150# MI Black 1.00 EA 12 1 52 (15501 1638 > 3" 90 Degree Ell,150# MI Black 1.00 EA 12 1 52 (15501 1638 > 3" Three, Red Out 150# MI Black 1.00 EA 12 1 2 73 (15501 1612 > 6" (15cm) A-53 Pipe, Sch 40 6.00 LF 57 2 73 (15501 161) > 6" Dipe,1-1/2"Thk Pbgs Pipe Cvr 6.00 LF 57 2 73 (15501 161) > 6" Dipe,1-1/2"Thk Pbgs Pipe Cvr 6.00 LF 12 1 25 (15501 138 > 6" Thread-0-Let, 300# Forge Stl 3.00 EA 140 9 375 (15503 1103 > 34" Strainer (Iron Body) 7" Type, 250# (113kg) Screwed Ends 1.00 EA 64 1 28 (15501 1822 > 34" Union, 150# MI Black 10.00 LF 9 1 25 (15501 1822 > 34" Dipe,1"Thk Pib Pipe Cover 10.00 LF 9 1 25 (15185 1002 > 34"D Pipe,1"Thk Pib Pipe Cover 10.00 LF 9 1 25		M MIL AA <15061 1608 > 3"(80mm) A-53 Pipe,	20.00 LF	7.7	3	139	1	217
w/Fire Retardant Jackets 1258 Bronze Mtd w/Threaded Valve 125661 1638 > 3" Iron Body Gate Valve, Thrd 1256 Bronze Mtd w/Threaded Valve 125661 1638 > 3" Teor Body Gate Valve, Thrd 100 EA 46 6 263 1256 Bronze Mtd w/Threaded Valve 100 EA 46 6 263 125061 1638 > 3" Teo, Red Out 150# MI Black 100 EA 12 12 12 13 1256		Not <15185 1008 > 3"D		31	73	09	1	
125# Bronze Mtd w/Threaded Valve 6.00 EA 46 6 263		<15101 1304 >		476	Ŋ	206	8	
<pre>c15061 1638 > 3" 90 Degree Ell,150# MI Black 6.00 EA 46 6 6 6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5</pre>				:	•	,	ć	
		<15061 1638 >		94.	۰,	263	7 C	
Not Incl Hangers or Fittings		<15061 1698 >		57	7 7	73	·	
<pre>c15061 2388 > 6" Thread-O-Let, 300# Forge Stl 3.00 EA 140 9 375 1 c15061 2388 > 6" Thread-O-Let, 300# Forge Stl 3.00 EA 140 9 375 1 c15083 1103 > 3/4" Strainer (Iron Body)</pre>		715185 1011		12	г	25	0	
<pre><15061 2388 > 6" Thread-O-Let, 300# Forge St1</pre>		יייי האומי המוכדי			σ	375	13	
<pre><15.083 1103 > 3/4" Strainer (Iron Body)</pre>		<pre><15061 2388 > 6" inread-O-Let, soum rouge 20% added for 6" fitting</pre>		1	, '	;	•	
<pre><15125 2001 > 3/4"Float&TEAT Steam Trap,15PSI 1.00 EA 64 1 28 <15061 1822 > 3/4" Union, 150# MI Black <15061 1822 > 3/4" Union, 150# MI Black <15185 1002 > 3/4"D Pipe,1"Thk Fib Pipe Cover 10.00 LF 9 1 25 w/Fire Retardant Jackets</pre>		<15083 1103 > 3/4" Strainer (Iron v-Thume 250#(113kg)	1.00 EA	44	0	61	5	
<pre><15061 1822 > 3/4" Union, 150# MI Black</pre>			1.00 EA	64	1	28	0	
<pre><15185 1002 > 3/4"D Pipe,1"Thk Fib Pipe Cover 10.00 LF 9 1 25 w/Fire Retardant Jackets</pre>		<15061 1822 >		Z.	7	64	н (
		<15185 1002 >		6	F	25	0	

U.S. Army Corps of Engineers GRLYMS: Distributed Boilers - Fort Greely Utility Study Ft. Greely Utility Study (Distributed Boilers) 8. Bldg. 606 - Central Heating Plt PROJECT GRLYMS:

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			:		;	
		QUANTY UOM MATERIAL	MANHRS	LABOR EQUIPMNT	- 1	TOTAL COST
M MIL AA <15061 1602 > 3/.	3/4"(20mm) A-53 Pipe, Sch 40 Not Incl Hangers or Fittings	10.00 LF 6	1	27	0	33
M MIL AA <15101 1104 > 3/	3/4" Bronze 125# Gate Valve	2.00 EA 18	1	39	0	58
In. M MIL AA <15111 1105 > 3/	inreaded, brazed or Soldered 3/4" Swing Check Valve Brz 125#	2.00 EA 33	-	3	c	
	for Thrd, Brazed or Soldered Inst	i	1	n n	>	2
M MIL AA <15855 1145 > 12	12"x 3' Round Flue/Vent Pipe Galv Dbl Wall Breech/Smoke Dine	10.00 EA 469	8	328	٣	800
M MIL AA <15855 1186 > 12	12" Round Flue/Vent Pipe Tees	2.00 EA 137	4	166	7	305
Ga. M MIL AA <15855 1216 > 12	Galv Dbl Wall Breech/Smoke Pipe 12"Rnd Flue/Vent Adi Roof Flash	2.00 FA	-	u	-	ā
	Galv Dbl Wall Breech/Smoke Pipe	Š	•	CC	-	16
M MIL AA <15855 1196 > 12	12" Round Flue/Vent Top Caps	2.00 EA 109	1	55	1	165
GA: M MIL AA <15063 1004 > 1"	daty DD1 Wall Breech/Smoke Pipe 1"(25mm) Cu Pipe/Tubing Type L	20.00 LF 26	H	57	H	83
	Flue Drain	i				
MIL AM <15104 1103 >	ı" inreaded Ball Valve, CS Trım Regular Port, Flue Drain	2.00 EA 37	-	47	0	84
M MIL AA <15063 1044 > 1"	1" 90 Degree Elbow, Copper	5.00 EA 4	H	9	-	65
M MIL AA <15063 1006 > 1-3	rice Diain 1-1/2"(40mm) (h Pine/Thhing Th I.	20 00 05	r		,	
MIL AA <15185 1005 >	Ğ,	i.F	7 7	83		183
W/E	W/Fire Retardant Jackets		,			
C COIT 771CTS W 7TH	1-1/2 X 1-1/2" Brz FkV, inrd Boiler Relief Valves	Z.00 EA 260	73	71		332
M MIL AA <15061 1635 > 1-1	1-1/2" 90 Deg Ell, 150# MI Black	2.00 EA 3	-	35	0	38
Boj MIL AA <15092 1201 > 2	Boiler Relief Valve 2 07" ID Greel Dine Gloom	, s	c	Ç	•	;
	Roof Pipe Boot		7	6/	~ 1	131
M MIL AA <15063 1003 > 3/4	3/4"(20mm) Cu Pipe/Tubing Type L	15.00 LF 14	1	36	0	20
	Boiler Drain					
M MIL AA <15063 1043 > 3/4 Boi	3/4" 90 Degree Elbow, Copper Roiler Drain	4.00 EA 1	7	38	0	40
M MIL AA <15063 1003 > 3/4	3/4"(20mm) Cu Pipe/Tubing Type L	30.00 LF 28	8	72	-	001
	Boiler Fill		ı	•	,	9
M MIL AA <15121 1202 > 3/4	3/4"Thrd St Press Regul & Red, IB	1.00 EA 102	H	43	0	145
Boi	ogi seal,sprg boad bir Act blap Boiler Fill					
M MIL AA <15104 1102 > 3/4	3/4" Thrd Ball Valve, CS Trim	3.00 EA 42	8	29		109
		i				
S SOIT COOCTS WE TIME	3/4" Strainer (Iron Body) V-Thme Den#(1131/4) Seremed	1.00 EA 44	0	19	0	64
End	Ends, Boiler Fill					
M MIL AA <15080 3201 > 3.5	3.5"Diameter Dial Pressure Gauge	1.00 EA 57	н	28	0	8 0
Alu Boi	Aluminum Case 0-300PSI Boiler Fill					
M MIL AA <15122 1102 > 3/4	3/4"x3/4"Brz Press Rlf Vlv, Thrd	1.00 EA 14	н	22	0	36
M MIL AA <15063 1043 > 3/4	3/4" 90 Degree Elbow, Copper	5.00 EA 2	H	48	0	50
	Į					
MIN AM SISUBS 1023 >	3/4" Copper Tee - Straight Sweat Boiler Fill	2.00 EA 1	1	29	0	30

CREW ID: FRBK94 UPB ID: A

Currency in DOL

VIP ID: ALASKA

LABOR ID: FRBK94

Currency in DOLLARS

Mon 18 Mar 1996 Eff. Date 03/18/06 DETAILED ESTIMATE

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8.09. HVAC		QUANTY UOM MATERIAL	ATERIAL	MANHRS	LABOR EQUIPMNT	: :	TOTAL COST
	M MIL AA <15720 2002 > Duplex Pump & Motor, 1 HP, 25GPM	1.00 EA	2,150	13	554	ø	2,710
	Sw. Condensate Return Pumps M MIL AA <15061 1602 > 3/4"(20mm) A-53 Pipe, Sch 40 Not Inc] Hanners or Fittings	40.00 LF	25	m	107	7	134
	Condensate Return Pumps M MIL AA <15185 1002 > 3/4"D Pipe,1"Thk Fib Pipe Cover	40.00 LF	36	ю	102	н	139
	W/Fire Retardant Jackets M MIL AA <15101 1104 > 34" Bronze 122# Gate Valve Threaded Braned or Soldered	2.00 EA	18	н	39	0	58
	Condensate Return Pumps M MIL AA <15111 1105 > 3/4" Swing Check Valve Brz 125# for Thrd, Brazed or Soldered	1.00 EA	17	o	19	0	36
	Inst, Condensate Return Pumps M MIL AA <15092 1201 > 2.07" ID Steel Pipe Sleeve	1.00 EA	25	ı	40	Ħ	99
	Root Pipe Boot M CIV AA <02113 6011 > Rem 1/2 to 4" D Asb Pipe Insul	5.00 LF	20	-	22	73	44
	Air-Cell Glove, Semi-Isolated CIV AA <02111 9202 > Demo Metal Pipe to 4" (10cm) D	5.00 LF	0	0	19	0	19
F1-27	cut piping for connection to existing system (8). M MIL AA <15061 1636 > 2" 90 Degree ELL,150# MI Black For connection to existing system	1.00 EA	N	1	. 22	0	25
	TOTAL Steam Distribution Systems		4,861	93	3,912	51	8,824
	TOTAL Distribution Systems		4,861	93	3,912	51	8,824
	TOTAL HVAC		36,892	357	14,737	998	52,495
	TOTAL Bldg. 606 - Central Heating Plt		36,892	357	14,737	998	52,495

Eff. Date 03/18/06 DETAILED ESTIMATE Mon 18 Mar 1996

U.S. Army Corps of Engineers
SRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
9. Bldg. 612 - Tank Maintenance PROJECT GRLYM5:

TIME 11:51:38

25 LABOR EQUIPMNT TOTAL COST DETAIL PAGE QUANTY UOM MATERIAL MANHRS

9. Bldg. 612 - Tank Maintenance

9.09. HVAC

9.09.

This system includes all equipment, distrbution systems, controls, and energy supply systems required by the heating, ventilating, and air conditioning system.

9.09.02. Heating Generating Systems

This subsystem includes steam, hot water, furnace, and heater systems. Fuel include coal, oil, gas and electric unless otherwise noted.

9.09.02.01. Steam Boilers

separators, pumps, heat exchangers, boiler feed units, etc. This assembly would also include fittings and specialties and the flue stack. The unit of Assemblies include boilers, expansion tanks, chemical feeders, air measure at the assembly level is each.

2.00 EA M MIL AA <15624 1008 > 1274 MBH Oil Fired H20 Tube Blr

29,456

530

7,036

172

21,890

29,456

530

7,036

172

21,890

29,456

530

7,036

172

21,890

217 92 684 311 64 33

35 28 73 131 37

Stl Shell w/Insul Jacket & Ctrls

TOTAL Steam Boilers

TOTAL Heating Generating Systems

F1-28

9.09.04. Distribution Systems
This includes systems that distribute heated and cooled air, ventilating and exhaust air, hot and chilled water, steam, and glycol heating.

9.09.04.02. Steam Distribution Systems

Assemblies include pipe and fitting, including supports, wall and floor sleeves, and pipe insulation. The unit of measure at the assembly level is

~	4A <1506;	1 1608	M MIL AA <15061 1608 > 3"(80mm) A-53 Pipe, Sch 40	20.00 LF	77	ю	139	
× 5	15189	5 1008	Not incl Hangers or Fittings M MIL AA <15185 1008 > "D Pipe,1" Thk Fbgs Pipe Cover	20.00 LF	31	77	09	-
v ≸	15101	1 1304	<pre>w/Fire Retardant Jackets M MIL AA <15101 1304 > 3" Iron Body Gate Valve, Thrd</pre>	3.00 EA	476	'n	206	~
	,		125# Bronze Mtd w/Threaded Valve					ı
\$	<15061	1 1638	M MIL AA <15061 1638 > 3" 90 Degree Ell,150# MI Black	6.00 EA	46	9	263	2
\$	<15061	1 1698	M MIL AA <15061 1698 > 3" Tee, Red Out 150# MI Black	1.00 EA	12	7	52	0
5	<15061	1 1602	M MIL AA <15061 1602 > 3/4"(20mm) A-53 Pipe, Sch 40	10.00 LF	ø	-	27	0
			Not Incl Hangers or Fittings					
٧ 5	15185	M MIL AA <15185 1002 >	> 3/4"D Pipe,1"Thk Fib Pipe Cover	10.00 LF	60	-	25	0
			w/Fire Retardant Jackets					
5	:15101	1 1104	M MIL AA <15101 1104 > 3/4" Bronze 125# Gate Valve	2.00 EA	18	1	39	0
			Threaded, Brazed or Soldered					
Š	:1511	1 1105	M MIL AA <15111 1105 > 3/4" Swing Check Valve Brz 125#	2.00 EA	33	1	39	0
			for Thrd, Brazed or Soldered Inst					
4	:15061	M MIL AA <15061 1612 >	> 6"(15cm) A-53 Pipe, Sch 40	6.00 LF	57	7	73	-
			Not Incl Hangers or Fittings					
٧ ح	15185	M MIL AA <15185 1011 >	> 6"D Pipe,1-1/2"Thk Fbgs Pipe Cvr	6.00 LF	12	Т	25	0
			w/Fire Retardant Jackets					

EQUIP ID: ALASKA

Currency in

UPB ID CREW ID: FRBK94

Mon 18 Mar 1996 Eff. Date 03/18/06 DETAILED ESTIMATE

9.09. HVAC

U.S. Army Corps of Engineers
PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
9. Bldg. 612 - Tank Maintenance

TIME 11:51:38

26 DETAIL PAGE

MILL AM C18061 2889 S G "Thread-O-Left, JOUR FORGE St.I. MILL AM C1803 1103 3 444 Strainer (Trem Rody) WILL AM C18125 2011 3 747-Elotatorate Rosen Tremple Bridge MILL AM C18125 2011 3 747-Elotatorate Rosen Tremple Bridge MILL AM C18125 2011 3 747-Elotatorate Rosen Tremple Bridge MILL AM C18125 2011 3 747-Elotatorate Rosen Tremple Bridge MILL AM C18125 2011 3 747-Elotatorate Rosen Tremple Bridge MILL AM C18125 2011 3 747-Elotatorate Rosen Tremple Bridge MILL AM C18125 2011 3 747-Elotatorate Rosen Tremple Bridge MILL AM C18125 2011 3 747-Elotatorate Rosen Tremple Bridge MILL AM C18125 1145 - Jin's Round Fluctworm Fighe Tremple Bridge MILL AM C18125 1145 - Jin's Round Fluctworm Fighe Tremple Bridge MILL AM C18125 1145 - Jin's Round Fluctworm Fighe Tremple Bridge MILL AM C18125 1145 - Jin's Round Fluctworm Fighe Tremple MILL AM C18125 1145 - Jin's Round Fluctworm Fighe Tremple MILL AM C18125 1145 - Jin's Round Fluctworm Fighe Tremple MILL AM C18125 1145 - Jin's Round Fluctworm Fighe Tremple MILL AM C18125 1145 - Jin's Round Fluctworm Fighe Tremple MILL AM C18125 1104 3 Fluctworm Fighe Tremple MILL AM C18125 1105 3 Fluctw	1			QUANTY	QUANTY UOM MATERIAL	MANHRS	LABOR 1	LABOR EQUIPMNT	TOTAL COST	3
MIL A 4:15081 1100 2 201 added for \$6 filting 1:00 EA 4:00	MIL AA	2388	6" Thread-O-Let, 300# Forge	3.00			375	13		529
WIL AM 415013 1003 A1/4* Strainer (Into Body) 1.00 EM 44 0 19			20% added for 6" fitting				•			
MIL AA -15855 108 3.47 3	Ş			1.00			19	0		64
MIL AA (1563 102) 2 3/4" windom, 150# MT Black MIL AA (1565 1182 2) 3/4" windom, 150# MT Black MIL AA (1565 1185 1182 2) 3/4" windom, 150# MT Black MIL AA (1565 1186 2) 12" Round Flue/Vent Abject MIL AA (1565 1186 2) 12" Round Flue/Vent Abject MIL AA (1565 1186 2) 12" Round Flue/Vent Abject MIL AA (1565 1186 2) 12" Round Flue/Vent Abject MIL AA (1565 1186 2) 12" Round Flue/Vent Abject MIL AA (1565 1186 2) 12" Round Flue/Vent Abject MIL AA (1565 1186 2) 12" Round Flue/Vent Abject MIL AA (1565 1186 2) 12" Round Flue/Vent Abject MIL AA (1565 1186 2) 12" Round Flue/Vent Abject MIL AA (1565 1186 2) 12" Round Flue/Vent Abject MIL AA (1565 1186 2) 12" Round Flue/Vent Abject MIL AA (1565 1186 2) 12" Round Flue/Vent Abject MIL AA (1585 1186 2) 12" Round Flue/Vent Abject MIL AA (1585 1186 2) 12" Round Flue/Vent Abject MIL AA (1585 1186 2) 12" Round Flue/Vent Abject MIL AA (1585 1186 2) 12" MT (1585 1186 2) 12	MIL AA	2001		1.00		-	28	c		00
MIL AA <15855 1145 > 12** X 1** Round Flue/Vent Pipe	MIL AA		> 3/4" Union. 150# MI Black	4.00)		4	· -		2 6
MIL AA -15855 1186 - 12* Recard Flue/Verte Pipe Teach State	MIL AA			10.00	46		328	·m		800
MIL AA <15855 1186 5 12* Round Flue/Vent Pipe Tees MIL AA <15855 1186 5 12* Round Flue/Vent Pipe Pipe MIL AA <15855 1195 12* Round Flue/Vent Pipe MIL AA <15855 1195 12* Round Flue/Vent Pipe Galv Dall Wall Breach/Snoke Pipe Galv Dall Wall Breach/Snoke Pipe Galv Dall Wall Breach/Snoke Pipe Galv Dall Wall Breach/Snoke Pipe Galv Dall Wall Breach/Snoke Pipe MIL AA <15063 1004 1* (25mm) Cu Pipe/Tubing Type L MIL AA <15063 1004 1* (25mm) Cu Pipe/Tubing Type L MIL AA <15063 1004 1* (25mm) Cu Pipe/Tubing Type L MIL AA <15063 1004 1* (25mm) Cu Pipe/Tubing Type L MIL AA <15063 1005 1* (172* Bre ERV) Third MIL AA <15063 1005 1* (172* Bre ERV) Third MIL AA <15063 1005 1* (172* Bre ERV) Third MIL AA <15063 1005 1* (172* Bre ERV) Third MIL AA <15063 1005 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1003 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1003 1003 1* (172* Bre ERV) Third MIL AA <15063 1003 1003 1003 1003 1003 1003 1003 1			Galv Dbl Wall Breech/Smoke Pipe							
MIL AA <15855 1216 127 Fand Flue/Vent Adj Roof Flash 2.00 EA 35 155 624 V Data 421 Breech/Smoke Pipe 2.00 EA 109 155 624 V Data 421 Breech/Smoke Pipe 2.00 EA 109 155 624 V Data 421 Breech/Smoke Pipe 2.00 EA 109 1 55 624 V Data 225 EA 109 1 55 624 V Data 225 EA 2	MIL AA	1186		2.00	EA	4	166	2		305
MIL AA 415053 1100 - 1" (25mm) Cu Pipe/Vubing Type L 20.00 EA 37 11 55 63	;			•	i	,		,		
MIL AA <15053 1196 > 127* Round Flue/Vent Top Caps MIL AA <15063 1004 > 1'(25mm) Cut Pipe/Minke Pipe MIL AA <15063 1004 > 1'(25mm) Cut Pipe/Minking Type L MIL AA <15063 1004 > 1'(25mm) Cut Pipe/Minking Type L MIL AA <15063 1004 > 1'(25mm) Cut Pipe/Minking Type L MIL AA <15063 1004 > 1'(25mm) Cut Pipe/Minking Type L MIL AA <15063 1004 > 1'(25mm) Cut Pipe/Minking Type L MIL AA <15063 1004 > 1'(25mm) Cut Pipe/Minking Type L MIL AA <15185 1005 > 1-1/2* Pipe L "Th* Fib Pipe Cut MIL AA <15185 1005 > 1-1/2* Pipe L "Th* Fib Pipe Cut MIL AA <15185 1005 > 1-1/2* Pipe L "Th* Fib Pipe Cut MIL AA <15185 1005 > 1-1/2* Pipe L "Th* Fib Pipe Cut MIL AA <15185 1005 > 1-1/2* Pipe L "Th* Fib Pipe Cut MIL AA <15185 1005 > 1-1/2* Pipe L "Th* Fib Pipe Cut MIL AA <15092 1201 > 0'' ID Fibe L Th* Fib Pipe Cut MIL AA <15093 1201 > 0'' ID Fibe L Th* Fib Pipe Cut MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1003 > 3/4* (20mm) Cut Pipe/Tubing Type L MIL AA <15063 1004 > 100 Pipe/Tubing Type L	₹	1216		2.00	EA	Н	22	H		91
AA -15063 1004 > 1"(25smm) Cu Pipe/Tubing Type L AA -15104 1103 > 1"(175smm) Cu Pipe/Tubing Type L AA -15104 1103 > 1"Threaded Ball Valve, CS Trim AA -15063 1004 > 1"(175mm) Cu Pipe/Tubing Type L AA -15063 1004 > 1"(175m Proft, Flue Drain AA -15063 1004 > 1"(175m Proft, Flue Drain AA -15063 1006 > 1"1/2" Pipeley-Trubhing Type L AA -15185 1005 > 1"1/2" Pipeley-Trubhing Type L AA -15185 1005 > 1"1/2" Pipeley-Trubhing Type L AA -15185 1005 > 1"1/2" Pipeley-Trubhing Type L AA -15182 1105 > 1"1/2" A 1"1/2" Pipeley-Trubhing Type L AA -15061 1635 > 1"1/2" A 1"1/2" Pipeley-Trubhing Type L AA -15061 103 > 1"(172m Pipeley-Trubhing Type L AA -15061 103 > 1"(172m Pipeley-Trubhing Type L AA -15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L AA -15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L AA -15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L AA -15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L AA -15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L AA -15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L AA -15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L AA -15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L AA -15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L AA -15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L AA -15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L BOILER Fill AA -15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L BOILER Fill AA -15063 1003 > 3/4"Thrid Ball Valve, CS Trim AA -15063 1003 > 3/4"Strainer (Iron Ball) Valve, CS Trim AA -15080 3201 > 3/4"Thrid Ball Valve, CS Trim AA -15080 3201 > 3/4"Strainer (Iron Ball) AA -15080 3201 > 3/4"Strainer (Iron Ball) AA -15080 3201 > 3/4"Strainer (Iron Ball) AA -15081 1003 > 3/4"Strainer (Iron Ball) AA -15083 1003 > 3/4"Strainer (Iron Ball) AA -15083 1003 > 3/4"Strainer (Iron Ball) AA -15083 1003 > 3/4"COpper Foe - 5 trainful Sweat C 200 EA	MIL AA			2.00	EA	-	55	1		165
A 415104 1102 3 1044 5 17 (20mm) Cut Pipe Tubing 1ype L 20.00 LF 26 1 5 7 1 4 7 4 7 4 15104 1103 1 17 Threaded Ball Valve, CS Trim 2.00 EA 37 1 4 7 4 7 4 15063 1044 5 1" 90 Degree Elbow, Copper 5 5.00 EA 4 1 60	;			0	Į.	•	į	•		
AA c15063 1044 > 1" Threaded Ball Valve, CS Trim	§	5 007		70.00		-	۶,	⊣		83
A 4.5563 1044 > 1" 90 Degree Elbow, Copper A 4.5165 106	MIL AA		1" Threaded Ball Valve, CS	2.00	EA	1	47	0		84
A 4.5063 1044 > 1" 90 Degree Elbow, Copper			Regular Port, Flue Drain							
AA <15105 1005 1-1/2' topm) Cu Pipe/Tubing Tp L 30.00 LF 67 31 115 AA <15105 1005 1-1/2' To Pipe, 1"Thk Pib Pipe Cvr 30.00 LF 34 2 83 AA <15102 1105 1-1/2' To Pipe, 1"Thk Pib Pipe Cvr 30.00 LF 34 2 83 AA <15102 1105 1-1/2' To Pipe, 1"Thk Pib Pipe Cvr 30.00 LF 36 AA <15061 1635 1-1/2' " Brz PRV, Thrd 2.00 EA 3 1 35 Boiler Relief Valves 2.00 EA 49 2 79 AA <15062 1201 2.07" ID Steel Pipe Sleeve 2.00 EA 49 2 79 AA <15063 1003 344" (20mm) Cu Pipe/Tubing Type L 15.00 LF 14 1 36 AA <15063 1003 3/4" (20mm) Cu Pipe/Tubing Type L 30.00 LF 28 2 72 AA <15063 1003 3/4" (20mm) Cu Pipe/Tubing Type L 30.00 LF 28 2 72 AA <15063 1003 3/4" (20mm) Cu Pipe/Tubing Type L 30.00 LF 28 2 72 AA <15063 1103 3/4" (20mm) Cu Pipe/Tubing Type L 30.00 LF 28 2 72 AA <15063 1103 3/4" (20mm) Cu Pipe/Tubing Type L 30.00 LF 28 2 72 AA <15063 1103 3/4" (20mm) Cu Pipe/Tubing Type L 30.00 LF 28 2 72 AA <15083 1103 3/4" (20mm) Cu Pipe/Tubing Type L 30.00 LF 28 2 72 AA <15083 1103 3/4" (20mm) Cu Pipe/Tubing Type L 30.00 LF 28 2 72 AA <15083 1103 3/4" (20mm) Cu Pipe/Tubing Type L 30.00 LF 28 AA <15083 1103 3/4" (30mm) Cu Pipe/Tubing Type L 30.00 EA 44 0 19 AA <15083 1103 3/4" (30mm) Cu Pipe/Tubing Type L 30.00 EA 2 1 48 AA <15083 1103 3/4" (30mm) Cu Pipe/Tubing Type L 30.00 EA 2 1 48 AA <15083 1103 3/4" (30mm) Cu Pipe/Tubing Type L 30.00 EA 2 1 48 AA <15083 1003 3/4" (30mm) Cu Pipe/Tubing Type L 30.00 EA 2 1 48 AA <15083 1003 3/4" (30mm) Cu Pipe/Tubing Type L 30.00 EA 2 1 48 AA <15083 1003 3/4" (30mm) Cu Pipe/Tubing Type L 30.00 EA 2 1 48 AA <15083 1003 3/4" (30mm) Cu Pipe/Tubing Type L 30.00 EA 2 1 48 AA <15083 1003 3/4" (30mm) Cu Pipe/Tubing Type L 30.00 EA 1 1 1 2 AA <15083 1003 3/4" (30mm) Cu Pipe/Tubing Type L 30.00 EA 1 1 1 2 AA <15083	MIL AA			5.00	EA 4	-	09	-		65
A 4.15.05 100.5 1-1/2° Pipe, 1"Thk Fib Pipe Cyr 30.00 LF 54 34 3 115 A 4.15.15 100.5 1-1/2° Pipe, 1"Thk Fib Pipe Cyr 30.00 LF 34 2 83 A 4.15.15 110.5 1-1/2° Pipe, 1"Thk Fib Pipe Cyr 30.00 LF 34 2 83 A 4.15.05 110.5 1-1/2° Pipe, 1"Thk Fib Pipe Cyr 30.00 LF 36 Boiler Relief Valves 2.00 EA 3 1 35 AA 4.15.092 1201 2.0° LD Steel Pipe Sleeve 2.00 EA 49 2 79 AA 4.15.092 1201 2.0° LD Steel Pipe Sleeve 2.00 EA 49 2 79 AA 4.15.092 1201 2.0° LD Steel Pipe Flubing Type L 15.00 LF 14 1 36 Boiler Drain A 4.15.063 1003 3/4" (20mm) Cu Pipe/Tubing Type L 30.00 LF 28 2 72 AA 4.15.063 1003 3/4" (20mm) Cu Pipe/Tubing Type L 30.00 LF 28 2 72 AA 4.15.01 1202 3/4" Thrd St Press Regul & Red, IB 1.00 EA 44 0 19 AA 4.15.01 1202 3/4" Thrd Ball Valve, CS Trim 3.00 EA 44 0 19 AA 4.15.01 110.2 3/4" Thrd Ball Valve, CS Trim 3.00 EA 57 1 28 AA 4.15.080 1301 3/4" Surface Elbow, Copper 5.00 EA 2 1 48 AA 4.15.080 1301 3/4" 90 Degree Elbow, Copper 5.00 EA 2 1 48 AA 4.15.081 1003 3/4" 90 Degree Elbow, Copper 5.00 EA 2 1 48 AA 4.15.081 1003 3/4" 90 Degree Elbow, Copper 5.00 EA 1 1 20 AA 4.15.081 1003 3/4" 90 Degree Elbow, Copper 5.00 EA 1 1 29 AA 4.15.063 1003 3/4" 90 Degree Elbow, Copper 5.00 EA 1 1 29 AA 4.15.063 1003 3/4" 90 Degree Elbow, Copper 5.00 EA 1 1 29 AA 4.15.063 1003 3/4" 90 Degree Elbow, Copper 5.00 EA 1 1 20 AA 4.15.063 1003 3/4" 90 Degree Elbow, Copper 5.00 EA 1 1 20 AA 4.15.063 1003 3/4" 90 Degree Elbow, Copper 5.00 EA 1 1 20 AA 4.15.063 1003 3/4" 90 Degree Elbow, Copper 5.00 EA 1 1 20 AA 4.15.063 1003 3/4" 90 Degree Elbow, Copper 5.00 EA 1 1 2 AA 4.15.063 1003 3/4" 90 Degree Elbow, Copper 5.00 EA 1 1 2 AA 4.15.063 1003 3 3 3 3 3 3 3 3 3	;	,	Flue Drain	6			,	•		,
A4 -15122 1105 1017 117 117 117 117 117 117 117 117 11	MIL AA	1006	1-1/2" (40mm) Cu Pipe/Tubing	30.00	LF.		115			183
AA <1502 1105 > 1-1/2" x 1-1/2" Brz PRV, Thrd A <15061 1635 > 1-1/2" \$11/2" Brz PRV, Thrd AA <15061 1635 > 1-1/2" 90 Deg Ell, 150# MI Black AA <15061 1635 > 1-1/2" 90 Deg Ell, 150# MI Black AA <15062 1201 > 2.07" ID Steel Pipe Sleeve AA <15063 1003 > 34" (20mm) Cu Pipe/Tubing Type L	7				ä		0	-		Ť
Ad <15061 1635 > 1-1/2 90 Degree Ell, 150# MI Black 2.00 EA 3 1 35 Ad <15061 1635 > 1-1/2 90 Degree Ell, 150# MI Black 2.00 EA 49 2 79 Ad <15092 1201 > 2.07" ID Steel Pipe Sleeve 2.00 EA 49 2 79 Roof Pipe Boot	MIL AA	1105	1-1/2"	2.00	EA		71	-		332
AA <15061 1635 > 1-1/2" 90 Deg Ell, 150# MI Black 2.00 EA 3 1 35			Boiler Relief Valves							
AA <15092 1201 b 20.07" ID Steel Pipe Sleeve	MIL AA		1-1/2"	2.00	EA	7	35	0		38
AA <15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L 15.00 LF 14 1 36 Roof Pipe Boot Boot Boot Boot Boot Boot Boot Boo	MTI. AA			,			70	,		,
AA <15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L 15.00 LF 14 1 1 36 Boiler Drain AA <15063 1043 > 3/4" 90 Degree Elbow, Copper 4.00 EA 1 1 1 38 Boiler Drain AA <15063 1003 > 3/4"(20mm) Cu Pipe/Tubing Type L 30.00 LF 28 2 72 Boiler Fill AA <15121 1202 > 3/4"(20mm) Cu Pipe/Tubing Type L 30.00 LF 28 2 72 Boiler Fill AA <15121 1202 > 3/4"Thrd St Press Regul & Red,IB 1.00 EA 42 2 67 Regular Port, Boiler Fill AA <15083 1102 > 3/4" Strainer (Iron Body) 1.00 EA 42 2 67 Regular Port, Boiler Fill AA <15080 3201 > 3.5"Diameter Dial Pressure Gauge 1.00 EA 57 1 28 Aluminum Case 0-300PSI 1.00 EA 14 14 12 Boiler Fill AA <15063 1102 > 3/4"X3/4"Brz Press RIf Vlv, Thrd 1.00 EA 2 0 19 Boiler Fill AA <15063 1023 > 3/4" Copper Tee - Straight Sweat 2.00 EA 1 1 1 29 Boiler Fill AA <15063 1023 > 3/4" Copper Tee - Straight Sweat 2.00 EA 1 1 1 29							2	n		7.7
AA <15063 1043 > 34" 90 Degree Elbow, Copper	MIL AA		3/4"(20mm) Cu Pipe/Tubing Type	15.00		1	36	0		20
AA <15063 1043 > 344" 90 Degree Elbow, Copper A <0 0 EA	;		Boiler Drain							
AA <15063 1003 > 30.1er Fill AA <151063 1003 > 50.1er Fill AA <15121 1202 > 3/4"Thrd St Press Regul & Red,IB	MIL AA		3/4" 90 Degree	4.00		≓	38	0		40
AA <15121 1202 > 3/4"Thrd St Press Regul & Red,IB	MII, AA	1003	Soller Drain 3/4"(20mm) Ch Pine/Thibing Type	30.05			7.	-		100
AA <15121 1202 > 3/4"Thrd St Press Regul & Red,IB)))	Boiler Fill				1	•		4
Sgl Seat, Sprg Load Dir Act Diap Boiler Fill AA <15104 1102 > 3/4" Thrd Ball Valve, CS Trim Regular Port, Boiler Fill AA <15083 1103 > 3/4" Strainer (Iron Body) Y-Type, 250#(113kg) Screwed Ends, Boiler Fill AA <15080 3201 > 3.5"Diameter Dial Pressure Gauge Aluminum Case 0-300PSI Boiler Fill AA <15063 1023 > 3/4" 3/4"Brz Press Rlf Vlv, Thrd Boiler Fill AA <15063 1023 > 3/4" 90 Degree Elbow, Copper Boiler Fill	MIL AA	1202		1.00			43	0		145
AA <15081 1102 > 3/4" Thrd Ball Valve, CS Trim 3.00 EA 42 2 67 Regular Port, Boiler Fill AA <15083 1103 > 4" Strainer (Iron Body) 1.00 EA 44 0 19 Y-Type, 2.50# (Ill3Kg) Screwed Ends, Boiler Fill Ends, Boiler Fill AA <15080 3201 > 3.5" Diameter Dial Pressure Gauge 1.00 EA 57 1 28 Aluminum Case 0-300PSI Boiler Fill AA <15122 1102 > 34" x374"Brz Press Rlf Vlv, Thrd 1.00 EA 14 1 22 Boiler Fill AA <15063 1043 > 34" 90 Degree Elbow, Copper 5.00 EA 2 1 49 Boiler Fill AA <15063 1023 > 34" COpper Tee - Straight Sweat 2.00 EA 1 1 1 29 Boiler Fill Boiler Fill Boiler Fill AB <15063 1023 > 34" Copper Tee - Straight Sweat 2.00 EA 1 1 1 29			Sgl Seat, Sprg Load Dir Act Diap Boiler Fill							
AA <15083 1103 > 34" Strainer (Iron Body)	MIL AA	1102		3.00	EA		67	1		109
AA <15080 3201 > 3.5"Diameter Dial Pressure Gauge				•	į		,			•
AA <15080 3201 > 3.5"Diameter Dial Pressure Gauge	MIL AA		3/4" Strainer (Iron V-Twne, 250#(113kg)	1.00	EA		19	0		64
AA <15080 3201 > 3.5"Diameter Dial Pressure Gauge 1.00 EA 57 1 28 Aluminum Case 0-300PSI Boiler Fill AA <15122 1102 > 3/4"x3/4"Brz Press Rlf Vlv, Thrd 1.00 EA 14 1 22 Boiler Fill AA <15063 1043 > 3/4" 90 Degree Elbow, Copper 5.00 EA 2 1 48 Boiler Fill AA <15063 1023 > 3/4" Copper Tee - Straight Sweat 2.00 EA 1 1 29 Boiler Fill										
AA <15122 1102 > 344"x34"Brz Press Rlf Vlv, Thrd 1.00 EA 14 1 22 AA <15063 1043 > 34" 90 Degree Elbow, Copper 5.00 EA 2 1 48 Boiler Fill AA <15063 1023 > 34" Copper Tee - Straight Sweat 2.00 EA 1 1 29 Boiler Fill	MIL AA		3.5"Diameter Dial Pressure Aluminum Case 0-300PSI	1.00	EA		28	0		82
AA <15021 102 > 3/4"x3/4"Brz Press KII VIV, Thrd 1.00 EA 14 1 22 AA <15063 1043 > 3/4" 90 Degree Elbow, Copper 5.00 EA 2 1 48 Boiler Fill AA <15063 1023 > 3/4" Copper Tee - Straight Sweat 2.00 EA 1 1 29 Boiler Fill	:		Boiler Fill	,	i	,	;			
MIL AA <15063 1043 > 3/4" 90 Degree Elbow, Copper 5.00 EA 2 1 48 Boiler Fill MIL AA <15063 1023 > 3/4" Copper Tee - Straight Sweat 2.00 EA 1 1 29 Boiler Fill	¥	1102	3/4"x3/4"Brz Boiler Fill	1.00	EA		22	0		36
	MIL AA	1043	3/4" 90 Degree Elbow,	5.00		1	48	0		50
Boiler Fill	M MIL AA <15063		3/4" Copper	2.00		1	29	0		30
			Boiler Fill							

U.S. Army Corps of Engineers
PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
9. Bldg. 612 - Tank Maintenance

TIME 11:51:38

27 DETAIL PAGE

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nδ	QUANTY UOM MATERIAL	MTERIAL	MANHRS	LABOR E	LABOR EQUIPMNT	TOTAL COST
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<pre>lex Pump & Motor, 1 HP, 25GPM s Pump w/CI Receiver, Float</pre>	1.00 EA	2,150	13	554	v	2,710
Sw, Condensate Return Pumps M MIL AA <15061 1602 > 3/4"(20mm) A-53 Pipe. Sch 40 4	4.0 00 1.5	7,	~	101	-	70.
Not Incl Hangers or Fittings		3	ז	9	•	* C†
Condensace keturn rumps M MIL AA <15185 1002 > 3/4"D Pipe,1"Thk Fib Pipe Cover 4	40.00 LF	36	۳,	102	-	130
w/Fire Retardant Jackets	!))	1	•	00
M MIL AA <15101 1104 > 3/4" Bronze 125# Gate Valve	2.00 EA	18	-1	39	0	58
Threaded, Brazed or Soldered						
M MIL AA <15111 1105 > 3/4" Swing Check Valve Brz 125#	1.00 EA	17	0	19	0	36
for Thrd, Brazed or Soldered						
Inst, Condensate Return Pumps						
	1.00 EA	25	П	40	1	99
Roof Pipe Boot						
Asb Pipe Insul	5.00 LF	20	ч	22	2	44
	5.00 LF	0	0	19	0	19
Cut piping for connection to						
lack	1.00 EA	73	н	22	0	25
For connection to existing						
system						
TOTAL Steam Distribution Systems	•		: 0	1 1 1 1 1 1		1 6 6
		100	c c	3, 314	10	*70'0
TOTAL Distribution Systems	•	4,861	93	3,912	51	8,824
TOTAL HVAC		26,751	265	10,948	581	38,280
מייייים ביים אינים אולים	1					; ; ; ; ; ; ;
total bidg. 512 - Idlik Mailicenance		26,751	265	10,948	581	38,280

F1-30

Currency in

CREW ID: FRBK94 UPB ID:

03/18/06 DETAILED ESTIMATE Mon 18 Mar 1996 Eff. Date 03/18

RLYMS: Distributed Boilers - Fort Greely Utility Study Ft. Greely Utility Study (Distributed Boilers) 10. Bldg. 658 - Temporary Motor Pool U.S. Army Corps of Engineers PROJECT GRLYMS:

TIME 11:51:38

DETAIL PAGE

92 311 64 131 37 529 64 92 70 35 LABOR EQUIPMNT TOTAL COST 43,671 43,671 43,671 684 815 815 815 N 0 7 0 13 0 0 1 0 10,825 139 9 206 263 52 73 25 375 19 28 64 25 10,825 10,825 265 265 265 MANHRS QUANTY UOM MATERIAL 77 31 476 46 12 57 12 140 44 64 ro 0 32,031 32,031 32,031 2.00 EA EA EA LF 20.00 LF EA EA LF 3.00 EA 1.00 EA 20.00 LF 3.00 EA 6.00 LF 6.00 6.00 1.00 4.00 10.00 1.00 Stl Shell w/Insul Jacket & Ctrls 125# Bronze Mtd w/Threaded Valve <15185 1011 > 6"D Pipe, 1-1/2"Thk Fbgs Pipe Cvr Y-Type, 250#(113kg) Screwed Ends <15125 2001 > 3/4"Float&Tstat Steam Trap,15PSI M MIL AA <15624 1012 > 1764 MBH Oil Fired H20 Tube Blr M MIL AA <15185 1008 > 3"D Pipe,1" Thk Fbgs Pipe Cover <15061 2388 > 6" Thread-O-Let, 300# Forge Stl
20\$ added for 6" fitting <15185 1002 > 3/4"D Pipe, 1"Thk Fib Pipe Cover M MIL AA <15061 1638 > 3" 90 Degree Ell,150# MI Black M MIL AA <15061 1698 > 3" Tee, Red Out 150# MI Black M MIL AA <15101 1304 > 3" Iron Body Gate Valve, Thrd Not Incl Hangers or Fittings Not Incl Hangers or Fittings <15061 1612 > 6"(15cm) A-53 Pipe, Sch 40 M MIL AA <15061 1608 > 3"(80mm) A-53 Pipe, Sch 40 TOTAL Heating Generating Systems MIL AA <15125 2001 > 3/4"Float&Tstat Steam Trag MIL AA <15061 1822 > 3/4" Union, 150# MI Black MIL AA <15185 1002 > 3/4"D Pipe,1"Thk Fib Pipe <15083 1103 > 3/4" Strainer (Iron Body) w/Fire Retardant Jackets w/Fire Retardant Jackets w/Fire Retardant Jackets separators, pumps, heat exchangers, boiler feed units, etc. This assembly would also include fittings and specialties and the flue stack. The unit of measure at the assembly level is each. sleeves, and pipe insulation. The unit of measure at the assembly level is Assemblies include pipe and fitting, including supports, wall and floor This subsystem includes steam, hot water, furnace, and heater systems. Fuel Assemblies include boilers, expansion tanks, chemical feeders, air TOTAL Steam Boilers This includes systems that distribute heated and cooled air, ventilating and exhaust air, hot and chilled water, steam, and glycol heating. This system includes all equipment, distrbution systems, controls, and energy supply systems required by the heating, ventilating, and air include coal, oil, gas and electric unless otherwise noted B MIL AA M MIL AA MIL AA M MIL AA 10.09.04.02. Steam Distribution Systems 10.09.02. Heating Generating Systems 10.09.04. Distribution Systems 10.09.02.01. Steam Boilers 10. Bldg. 658 - Temporary Motor Pool conditioning system. 10.09. HVAC 10.09. HVAC

UPB ID: ANCH94

CREW ID: FRBK94

Currency in DOLLARS

EQUIP ID: ALASKA

LABOR ID: FRBK94

U.S. Army Corps of Engineers
PROJECT GRLYMS: Distributed Boilers - Fort Greely Utility Study
Ft. Greely Utility Study (Distributed Boilers)
10. Bldg. 658 - Temporary Motor Pool

TIME 11:51:38 DETAIL PAGE 29

			1	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					
Σ	MIL AA	A <15061	1602	> 3/4"(20mm) A-53 Pipe, Sch 40	10 00 T.E		t	c	ć
				Not Incl Hangers or F		٥	/7	>	33
Σ	MIL AA	A <15101	1104	7 3/4" Bronze 125# Gate Valve	2.00 EA	18 1	39	0	58
Σ	MIL AA	A <15111	1105	integued, Brazed of Soldered > 3/4" Swing Check Valve Brz 125#	C 00 C	,	Ċ	ď	í
						T	ų	Þ	1.3
Σ	MIL AA	A <15855	1145	> 12"x 3' Round Flue/Vent Pipe	10.00 EA	469 8	328	3	800
Σ	MIL AA	15855	1186	Galv Dbl Wall Breech/Smoke Pipe > 12" Round Flue/Vent Dine Tees	5		Ţ	Ó	
	!					13/	166	N	305
Σ	MIL AA	1 <15855	1216	> 12"Rnd Flue/Vent Adj Roof Flash	2.00 EA	35 1	55	-	91
2									
Σ	M MIL AA	. <15855 1196	1196	> 12" Round Flue/Vent Top Caps Galv Dbl Wall Breech/Smoke Pine	2.00 EA	109 1	55	7	165
Σ	MIL AA	1 <15063	1004	> 1"(25mm) Cu Pipe/Tubing Type L	20.00 LF	26 1	57	-	83
2	MTT. AA	715104	1103	Flue Drain			!		
:	1			Regular Port, Flue Drain	Z.00 EA	3/ 1	47	0	84
Σ	MIL AA	1 <15063	1044	> 1" 90 Degree Elbow, Copper	5.00 EA	4	09	7	65
				Flue Drain					
E 2	MIL AA	<15063	1006	1-1/2"(40mm) Cu Pipe/Tubing			115	П	183
	ILL AR			> 1-1/2"D Pipe, 1"Thk Fib Pipe Cvr	30.00 LF	34 2	83	 1	118
Σ	MIL AA	<15122	1105	<pre>w/fite recardant Jackets > 1-1/2" x 1-1/2" Brz PRV, Thrd</pre>	2.00 EA	260 2	1,7	-	333
				Boiler Relief Valves			!	4	1
Σ	MIL AA	<15061	1635	> 1-1/2" 90 Deg Ell, 150# MI Black	2.00 EA	3 1	35	0	38
2	Z Z		,						
		1071 760613 1	1021	> Z.U/" ID Steel Pipe Sleeve Roof Dine Boot	2.00 EA	49 2	79	m	131
Σ	MIL AA	<15063	1003	> 3/4"(20mm) Cu Pipe/Tubing Type L	15.00 LF	14	36	o	Or.
				Boiler Drain					1
Σ	MIL AA	<15063 1043	1043	> 3/4" 90 Degree Elbow, Copper	4.00 EA	1 1	38	0	40
2	MTT. AA	715063	1003	Boiler Drain			i		
	3		200		30.00 11.	28 2	72	н	100
Σ	MIL AA	<15121	1202	> 3/4"Thrd St Press Regul & Red, IB	1.00 EA	102 1	43	0	145
				Sgl Seat, Sprg Load Dir Act Diap Boiler Pill					
M	MIL AA	<15104 1102	1102	> 3/4" Thrd Ball Valve, CS Trim	3.00 EA	42 2	67	H	109
				Regular Port, Boiler Fill					h !
Σ	MIL AA	<15083	1103	> 3/4" Strainer (Iron Body)	1.00 EA	44 0	19	0	64
				Y-Type, 250#(113kg) Screwed					
M	MIL AA	<15080	3201	> 3.5"Diameter Dial Pressure Gauge	1 00 12	5.7	ä	c	i d
				Aluminum Case 0-30 Boiler Fill		1	20	5	8 2
Æ	MIL AA	<15122	1102	> 3/4"x3/4"Brz Press Rlf Vlv, Thrd	1.00 EA	14 1	22	0	36
				Boiler Fill					
Σ	MIL AA	<15063 1043	1043	> 3/4" 90 Degree Elbow, Copper Boiler Fill	5.00 EA	2 1	48	0	50
M	IL AA	M MIL AA <15063 1023	1023	> 3/4" Copper Tee - Straight Sweat	2.00 EA	1 1	29	0	30
				Boiler Fill					(

CREW ID: FRBK94 UPB ID:

SQUIP ID: ALASKA

LABOR ID: FRBK9

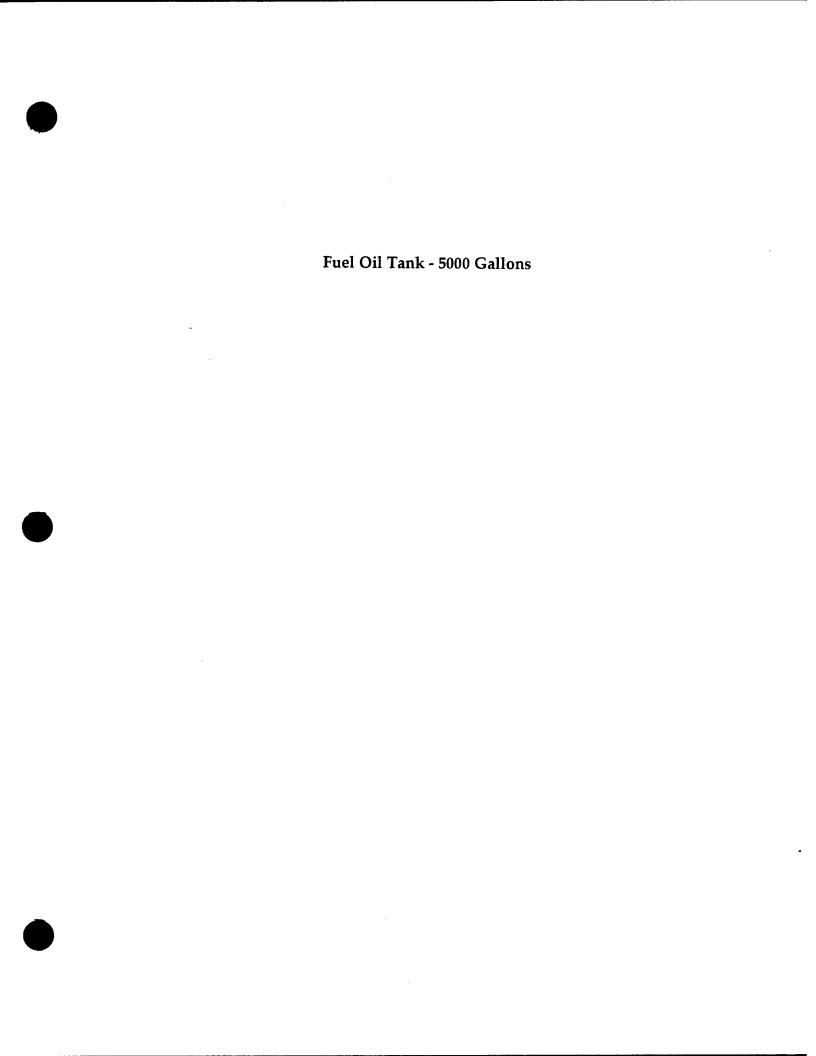
OUAN	NTY UOM	QUANTY UOM MATERIAL	MANHRS	LABOR	LABOR EQUIPMNT	TOTAL COST
M MIL AA <15720 2002 > Direlex Dime & Morey 1 HD 26720W 1	, 69			1 4		
Cnds Pump w/CI Receiver, Float Sw. Condensate Return Pumps		00112	CT.	#	Þ	2, 710
th 40	40.00 LF	25	Э	107		134
Condensate Return Pumps M MIL AA <15185 1002 > 3/*nD Pipe, I'Thk Fib Pipe Cover 40.	40.00 LF	36	ю	102	н	139
lve	2.00 EA	18	н	39	0	58
125#	1.00 EA	17	0	19	0	36
Inst, Condensate Return Pumps M MIL AA <15092 1201 > 2.07" ID Steel Pipe Sleeve	1.00 EA	25	1	40	Ħ	99
D Asb Pipe Insul	5.00 LF	20	-	22	2	44
	5.00 LF	0	0	19	0	19
existing system (8). M MIL AA <15061 1636 > 2" 90 Degree ELL,150# MI Black 1. Por connection to existing system	1.00 EA	7	н	22		25
TOTAL Steam Distribution Systems		4,861	93	3,912	51	8,824
TOTAL Distribution Systems		4,861	93	3,912	51	8,824
TOTAL HVAC		36,892	357	14,737	998	52,495
TOTAL Bldg. 658 - Temporary Motor Pool		36,892	357	14,737	998	52,495
TOTAL Distributed Boilers		346,721	3,039	125,433	6,775	478,930

UPB ID: ANCH94

CREW ID: FRBK94

Currency in DOLLARS

	Ŀ	5 Heating											
	15	5,100 Boilers		-	ı	LABOR-					RE COSTS		TOTAL
				EW	OUTPUT			(IT	MAT.	LABOR	EQUIP.	TOTAL	INC. EU
120	2160	794 MBH	٩	17	ŧ	71.111	Ε	2. I	6,600	2,050		8,650	
	2180	1,084 MBH	1_	L	.42	76.190		<u> </u>	7,600	2,200		9,800	-14
	2200	1,360 MBH			.38	84.211			8,875	2,425		11,300	13,5
	2220	1,600 MBH	1_	L	31	103	_	<u> </u>	10,100	2,975		13,075	15,7
	2240	2,175 MBH	1		28	114			13,000	3,300		16,300	19,4
	2260	2,480 MBH	╀-	L	25	128	L	L	15,200	3,700		18,900	22,4
	2280	3,000 MBH			.23	139			17,400	4,025		21,425	25,3
	2300	3,550 MBH	1_	L	.22	145		_	19,400	4,200		23,600	27,8
	2320	3,820 MBH	1		.19	168			20,700	4,875		25,575	30,3
	2340	4,360 MBH	1	<u> </u>	.17	188		_	23,100	5,450		28,550	33,7
	2360	4,940 MBH		1	.15	213			37,700	6,175		43,875	51,0
	2380	5,520 MBH	┺	L	.13	246		L	43,200	7,125		50,325	58,5
- 1	2400	6,100 MBH			.12	266		1	49,600	7,700		57,300	66,5
	2420	6,390 MBH	1	L	.10	320		_	52,500	9,250		61,750	71,5
1	2440	6,680 MBH	1	1	.09	355			53,500	10,300		63,800	74,5
	2460	6,970 MBH	ىــــــــــــــــــــــــــــــــــــــ	<u> </u>	.08	400	تــا	<u>L</u>	55,500	11,600		67,100	78,5
	3000	Hot water, same price as steam											
	4000	For tankless coil in smaller sizes, add	L				Ε	a.	15%				Ą
	5000	Steel, insulated jacket, burner	1		l								3,7
	6000	Steam, full water leg construction, gross output	L										2
	6020	144 MBH	Q	1 6	1.60	15	E	a.	2,825	425		3,250	3,7
	6040	198 MBH			1.40	17.143			3,075	485		3,560	4,1 5,0
	6060	252 MBH			1.30	18.462			3,825	520		4,345	
	6080	324 MBH	┸	L	1.20	20			4,375	5 65		4,940	5,6
	6100	396 MBH	I		.90	26.667			4,750	75 5		5,505	6,3
	6120	468 MBH	L	L	.80	30			5,200	850		6,050	7,0
	6140	648 MBH	1	1	.60	40			5,550	1,125		6,675	
	6160	792 MBH	┸	L	.50	48			6,525	1,350		7,875	
	6180	1,008 MBH	1		.45	53.333			8,075	1,500		9,575	11,2
	6200	1,260 MBH	L	L	.40	60			8,950	1,700		10,650	12,4
	6220	1,512 MBH			.35	68.571			10,700	1,950		12,650	14,8
	6240	1,800 MBH	L	L	.33	72.727			11,700	2,050		13,750	16,1
	6260	2,100 MBH			.26	92.308			13,800	2,600		16,400	19,2
	6280	2,400 MBH	Ŀ	<u>Ł</u>	.22	109	۷	_	15,400	3,075		18,475	21,7
	6400	Larger sizes are same as steel, gas fired	1.	_			_						3
	7000	Hot water, gross output, 103 MBH	10	1-6		12.632	E	a	1,900	355		2,255	2,6 2,7
	7020	122 MBH			1.80	13.333			1,950	375		2,325	
	7040	137 MBH	1_	L	1.60	15		L	2,050	425		2,475	2,9
	7060	168 MBH	1	1	1.50	16			2,450	450		2,900	3,4
	7080	225 MBH	1	Ļ	1.40	17.143		L	2,900	485		3,385	3,9 5,6
	7100	315 MBH	j		1	21.818			4,275	615		4,890	
	7120	420 MBH	1	上	.80	30		L	4,800	850		5,650	6,5 8,3
	7140	525 MBH		l	.65	36.923			6,100	1,050		7,150	
	7160	630 MBH	1	L	.60	40		L	6,175	1,125		7,300	8,5
	7180	735 M BH			.55	43.636			8,250	1,225		9,475	11,0
	7200	840 MBH	L	L	.50	48		_	9,425	1,350		10,775	12,5
	7220	1,050 MBH			.42	57.143			11,400	1,625		13,025	15,1
	7240	1,365 MBH	\bot	L	.37	64.865	L	_	14,600	1,825		16,425	18,9
	7260	1,680 MBH			.33	72.727			17,200	2,050		19,250	22,1
•	7280	2,310 MBH		L	.24	100	L	L	22,100	2,825		24,925	28,6
	7300	2,835 MBH			.17	141			27,500	4,000		31,500	36,3
—	7320	3,150 MBH	Ŀ	₩_	.13	184	L	L	30,900	5,225		36,125	41,9
	7340	For tankless coil in steam or hot water, add					3	7	7%				
125		BOILERS, GAS/OIL Combination with burners and controls	T				T						
	1000	Cast Iron with insulated jacket			<u> </u>	<u> </u>	<u> </u>					لـــــــل	



UPB ID: ANCH94

Mon 18 Mar 1996 Eff. Date 03/18/96

U.S. Army Corps of Engineers
PROJECT GRLYM8: Fuel Oil Boiler Option - Fort Greely Utility Study
Ft. Greely Utility Study (Fuel Oil System)

TIME 15:22:32

TITLE PAGE

uel Oil Boiler Option

Fuel Oil Boiler Option Fort Greely Utility Study Installation of Fuel Oil System for Boiler At School

Designed By: DGM Estimated By:

Prepared By: TCP

Preparation Date: 03/18/96 Effective Date of Pricing: 03/18/96

Sales Tax: 0.00%

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Currency in DOLLARS

LABOR ID: FRBK94 EQUIP ID: ALASKA

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U.S. Army Corps of Engineers
PROJECT GRLYM8: Fuel Oil Boiler Option - Fort Greely Utility Study
Ft. Greely Utility Study (Fuel Oil System)

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	SUMMARY PAGE	1	DETAIL PAGE	
	SUMMAKI KEPUKIS	PROJECT DIRECT SUMMARY - Scope	DETAILED ESTIMATE	19. Site Civil/Mechanical Utilities 08. Building Fuel Distribution Syst

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Mon 18 Mar 1996 Eff. Date 03/18/96

U.S. Army Corps of Engineers
PROJECT GRLYM8: Fuel 0il Boiler Option - Fort Greely Utility Study
Ft. Greely Utility Study (Fuel 0il System)
** PROJECT DIRECT SUMMARY - Scope **

TIME 15:22:32 SUMMARY PAGE 1

							omood admin tout tranch
	6,120						Contingency
	30,599						SUBTOTAL
	1,177						Escalation
	29,422						TOTAL INCL INDIRECTS
	857						Contractor's Bond
	28,565						SUBTOTAL
	2,597						Contractor's Profit
	25,968						SUBTOTAL
	: : : : : : : : : : : : : : : : : : : :						
	3,387						Contractor's Overhead
22581.00	22,581	575	5,778	140	16,229	1.00 EA	TOTAL Fuel Oil Boiler Option
22,581 22581.00	22,581	575	140 5,778	16,229 140 5,778	1.00 EA 16,229	1.00 EA	19 Site Civil/Mechanical Utilities
			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		; ; ; ; ; ;	1	
UNIT COST	LABOR EQUIPMNT TOTAL COST UNIT COST	EQUI PMNT	LABOR	MANHRS	MATERIAL	QUANTITY UOM MATERIAL MANHRS	
		1 1 1 1 1 1 1	1 1 1 1 1 1 1 1				

Mon 18 Mar 1996 Eff. Date 03/18/96 DETAILED ESTIMATE

U.S. Army Corps of Engineers
PROJECT GRLYM8: Fuel Oil Boiler Option - Fort Greely Utility Study
Ft. Greely Utility Study (Fuel Oil System)
19. Site Civil/Mechanical Utilities

TIME 15:22:32

DETAIL PAGE

19.08. Bu	19.08. Building Fuel Distribution Syst		QUANTY UOM MATERIAL	MATERIAL	MANHRS	LABOR EQUIPMNT	1	TOTAL COST
19. S	19. Site Civil/Mechanical Utilities				; ; ; ; ; ;	1 1 1 1 1 1 1 1 1) } } !
H	19.08. Building Fuel Distribution Syst em			-				
	19.08.01. Fuel Distribution Piping							
		M MIL AA <15142 1103 > 10GPM CI Rotary Pump, 60PSI 1HP	1.00 EA	1,064	13	521	Ŋ	1,590
		w/l" Discharge M MTI. AA <15061 1602 > 3/4"(20mm) A-52 Pinc Sch 40		č	,	•		
		Not Incl Hangers or Fi	150.00	č.	10	403	4	501
		1632 >	8.00 EA	ю	8	66	Н	103
		<15101 1104 >	4.00 EA	37	7	78	-	115
		715061 1903		,	•	1		
		1402 >	2.00 EA	70	n 0	128 80	н с	139
		Conduit w/Straight Connectors				}	,)
		M MIL AA <16111 3204 > RGS PVC Ctd 3/4"Conduit w/Cplg Direct Burial 20 Mil Coated	150.00 LF	321	œ	324	0	645
		For electrical connection to						
I								
F2.		B MIL AA <16120 1222 > #10 AWG Cable-XLP (xhhw)	0.50 MLF	65	S	194	7	259
-4		600V Cu, Sgl Strd, Pl in הק ופיורם						
		M USR AA < > Level Switch, Hvy Dtv, UL Listed	1.00 EA	200	m	110	c	610
		Weatherproof,		1)) 	>	9
		M MIL AA <16155 3112 > Comb Str,Sz 1,NEMA 1 w/Disc Sw	1.00 EA	310	7	318	1	628
		Non-Rev						
		M MIL AA <16155 2132 > H-O-A Sel Sw, Factory Mod-NEMA 1	1.00 EA	44	0	0	0	44
				•	,	,		
		CCTQTS	1.00 EA	53	0	0	0	53
		M MIL AA <16155 2151 > Mag Str xfmr, Size 0,1,Fcty Mod	1.00 EA	61	0	o	c	19
					•	•	,	;
		<16155 1241 >	3.00 EA	17	0	0	0	17
		M M1L AA <16155 1242 > Auxiliary Cont,Normally Closed	1.00 EA	9	0	0	0	9
		TOTAL Fuel Distribution Piping	•	2,605	5.4	2,254	14	4,872
	19.08.02. Fuel Storage Tanks							
		CIV AA <02225 1453 > Bulk Site Excavation, Heavy Clay	200.00 CY	0	m	129	193	121
					,		1	4 1 1
		M MIL AA <03311 1166 > Pour Slab on Gr,>= 6", Conc Pump	6.00 CY	552	1	44	13	609
		S (15 cm) Place 3000 PSI Conc א א א ארז ארז ארז ארז ארז ארז ארז ארז א		i i	;			
		Coated, In Place w/Hold Dov	1.00 EA	0/8//	43	1,759	132	9,762
		Bars. Material price taken						
		from 1996 Means Mechanical,						
		escalated for Alaska costs. MIL AA <02222 4104 > Foundation Backfill, w/Loader	150.00 CY	0	ю	129	78	206
		6" Lift without Compaction			,	1	2)) 1

LABOR ID: FRBK9

EQUIP ID: ALASKA

Currency in

CREW ID: FRBK94 UPB ID:

U.S. Army Corps of Engineers	PROJECT GRLYM8: Fuel Oil Boiler Option - Fort Greely Utility Study	Ft. Greely Utility Study (Fuel Oil System)	19 Site Civil/Mechanical IItilities
	T GRLYM		
	PROJEC		

19.08, Building Fuel Distribution Syst

Mon 18 Mar 1996 Eff. Date 03/18/96 DETAILED ESTIMATE

TIME 15:22:32
DETAIL PAGE 2

	QUANTY UOM MATERIAL MANHRS LABOR EQUIPMINT TOTAL COST	TERIAL	MANHRS	LABOR I	SQUI PMNT	LABOR EQUIPMNT TOTAL COST
USR AA < > Containment Basin/Tank Sump	1.00 EA	410		100	9	570
M MIL AA <15176 1005 > 50 Gal Day Tank	1.00 EA	1,292	25	1,005	16	2,373
Abv Gnd w/Supp,Coating&Fittings M MIL AA <15176 6011 > Sgl Chnl Ugnd Tk Monitoring Sys Material price taken from 1996	1.00 EA	3,500	80	359	6	3,868
Means Mechanical,.						
TOTAL Fuel Storage Tanks	•	13,624	98	3,524	561	13,624 86 3,524 561 17,709
TOTAL Building Fuel Distribution Syst	i	16,229	140	16,229 140 5,778 575	575	
TOTAL Site Civil/Mechanical Utilities	i	16,229	140	140 5,778	;	22,581
TOTAL Fuel Oil Boiler Option	;	16,229	140	140 5,778	575	22,581

Fuel Oil Tank - 2000 Gallons

U.S. Army Corps of Engineers Fuel Oil Boiler Option-5 Bldgs. - Fort Greely Utility Study Ft. Greely Utility Study (Fuel Oil System)

TITLE PAGE

Fuel Oil Boiler Option-5 Bldgs.
Fort Greely Utility Study
Installation of Fuel Oil
System for Boilers (Typical of
Bldg. 503,605,615,820,821)

DGW Designed By: Estimated By: TCP Prepared By:

03/18/96 03/18/96 Preparation Date: Effective Date of Pricing:

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EQUIP ID: ALASKA LABOR ID: FRBK94

Currency in DOLLARS

CREW ID: FRBK94 UPB ID: ANCH94

U.S. Army Corps of Engineers
PROJECT GRLYM9: Fuel Oil Boiler Option-5 Bldgs. - Fort Greely Utility Study
Ft. Greely Utility Study (Fuel Oil System)

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U.S. Army Corps of E Prel Oil Boiler Option-5 B Fres of Fritz of Fritz Crant Control of Prince Princ

Mon 18 Mar 1996 Eff. Date 03/18/96

U.S. Army Corps of Engineers
Fuel Oil Boiler Option-5 Bldgs. - Fort Greely Utility Study
Pt. Greely Utility Study (Fuel Oil System)
** PROJECT DIRECT SUMMARY - Scope **

SUMMARY PAGE 1

TIME 15:35:53

QUANTITY UOM MATERIAL MANHRS LABOR EQUIPMNT TOTAL COST UNIT COST	QUANTITY UOM MATERIAL	M MATERIAL	MANHRS	LABOR	EQUI PMNT	LABOR EQUIPMNT TOTAL COST UNIT COST	UNIT COST
19 Site Civil/Mechanical Utilities	E	10,614		4,117	4,117 254		14,985 14984.86
TOTAL Fuel Oil Boiler Option-5 Bldgs.	1.00 EA	10,614		4,117	254	14,985	 14,985 14984.86
Contractor's Overhead						2,248	
SUBTOTAL						17 233	
Contractor's Profit						1,723	
SUBTOTAL						18,956	
Contractor's Bond						269	
TOTAL INCL INDIRECTS						19,525	
Escalation						781	
						1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
SUBTOTAL						20,306	
Contingency						4,061	
						1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
TOTAL INCL OWNER COSTS						24,367	

Mon 18 Mar 1996 Eff. Date 03/18/96 DETAILED ESTIMATE

U.S. Army Corps of Engineers Fuel Oil Boiler Option-5 Bldgs. - Fort Greely Utility Study Ft. Greely Utility Study (Fuel Oil System) Project Distributed Costs PROJECT GRLYM9:

TIME 15:35:53

DETAIL PAGE

LABOR EQUIPMNT TOTAL COST QUANTY UOM MATERIAL MANHRS 0.01. Prime Contractor

0.01. Prime Contractor Cost estimate is calculated as typical for each building. Applies to Buildings 503, 605, 615, 820, and 821. 19. Site Civil/Mechanical Utilities

19.08. Building Fuel Distribution Syst

19.08.01. Fuel Distribution Piping

MIL AA <15142 1102 > 10GPM CI Rotary Pump, 40PSI 3/4HP	1.00 EA	1,005	11	438	4	1,447
W/1" Discharge MIL AA <15061 1602 > 3/4"(20mm) A-53 Pipe, Sch 40	125.00 LF	79	8	336	m	417
Not Incl Hangers		,	,		ı	
MII, AA <15101 1104 \ 3/4" BUCHES BII, 150# MI BIACK	8.00 EA	m t	Ν (66	.,	103
4		6	N	9	٦	115
AA <15061 1822 >	8.00 EA	10	٣	128	н	139
CIV AA <16111 1402 > 3/4"Liquid-Tight Flex Assem, 3'		20	2	80	0	100
						!
MIL AA <16111 3204 > RGS PVC Ctd 3/4"Conduit w/Cplg	125.00 LF	268	7	270	0	538
Direct Burial, 20 Mil Coated						
For electrical connection to						
MIL AA <16120 1222 > #10 AWG Cable-XLP (xhbw)	0.50 MLF	65	D.	194	-	259
Cod, 12'Ha.						
M USR AA < > Level Switch, Hvy Dty, UL Listed	1.00 EA	200	m	110	c	610
		i I	ı) 	,	1
MIL AA <16155 3112 > Comb Str, Sz 1, NEMA 1 w/Disc Sw	1.00 EA	310	7	318	-	628
Non-Rev						
M MIL AA <16155 2132 > H-O-A Sel Sw, Factory Mod-NEMA 1	1.00 EA	44	0	0	0	44
MIL AA <16155 2133 > Pilot Light, Factory Mod-NEMA 1	1.00 EA	53	0	0	0	53
M MIL AA <16155 2151 > Mag Str xfmr, Size 0,1, Fcty Mod	1.00 EA	61	0	0	0	61
AA <16155	3.00 EA	17	0	0	0	17
MIL AA <16155 1242 > Auxiliary Cont, Normally Closed	1.00 EA	9	0	0	0	9
TOTAL Fuel Distribution Distri				1 0		1 6 1 1
STICLE TO THE PROPERTY OF THE		(4	2,049	13	4,538
CIV AA <02225 1453 > Bulk Site Excavation, Heavy Clay	39.00 CY	0	Ħ	25	38	63
# LI Bucket Drag Line MII, AA <03311 1166 > Donn Clah on Ch >= 6" Cond Prime	6		•	ı	,	•
>= (15 cm) Place 3000 PSI Conc		184	>	CT	*	203

19.08.02. Fuel Storage Tanks

Currency in D

CREW ID: FRBK94 UPB ID:

QUIP ID: ALASKA LABOR ID: FRBK94

Currency in DOLLARS

1996	03/18/96	ESTIMATE
Mon 18 Mar	Eff. Date	DETAILED ES

19.08. Building Fuel Distribution Syst

U.S. Army Corps of Engineers
Fuel Oil Boiler Option-5 Bldgs. - Fort Greely Utility Study
Ft. Greely Utility Study (Fuel Oil System)
19. Site Civil/Mechanical Utilities PROJECT GRLYM9:

TIME 15:35:53

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PAGE
DETAIL

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ruo.	QUANTY UOM MATERIAL	TERIAL	MANHRS	LABOR EC	UIPMNT	LABOR EQUIPMNT TOTAL COST
		1 1 1 1 1 1	 	! ! ! ! ! !	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
ank	1.00 EA	4,268	13	541	41	4,850
Coated, In Place w/Hold Down						
Bars. Material price taken		-				
tion means mechanical, escalated for Alaska costs.						
er	27.00 CY	0	н	23	14	37
6" Lift without Compaction						
< > Containment Basin/Tank Sump	1.00 EA	410	7	100	9	570
M MIL AA <15176 1005 > 50 Gal Day Tank 1	1.00 EA	1,292	25	1,005	92	2,373
Abv Gnd w/Supp, Coating&Fittings						•
M MIL AA <15176 6011 > Sgl Chnl Ugnd Tk Monitoring Sys 1	1.00 EA	1,983	80	359	6	2,351
	1	1 1 1 1 1 1 1			1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1
TOTAL Fuel Storage Tanks		8,137	20	2,068	241	10,446
	;	1	1 1	;	1	
TOTAL Building Fuel Distribution Syst		10,614	66	4,117	254	14,985
TOTAL Site Civil/Mechanical Utilities	;	10,614		4,117	254	14,985
TOTAL Fuel Oil Boiler Option-5 Bldgs.	;	10,614		4,117	254	14,985

Fuel Oil Tank - 1000 Gallons

Mon 18 Mar 1996 Eff. Date 03/18/96

U.S. Army Corps of Engineers Fuel Oil Boiler Option-Bldg. 504 - Fort Greely Utility Study Ft. Greely Utility Study (Fuel Oil Boilers) PROJECT GRLYM3:

TIME 15:59:04

TITLE PAGE

Fuel Oil Boiler Option-Bldg. 504 Fort Greely Utility Study Installation of Fuel Oil Boilers - Building 504

M D C Designed By: Estimated By: Prepared By: TCP

Preparation Date: 03/18/96 Effective Date of Pricing: 03/18/96

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Currency in DOLLARS

LABOR ID: FRBK94

EQUIP ID: ALASKA

UPB ID: ANCH94 CREW ID: FRBK94

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U.S. Army Corps of Engineers
PROJECT GRLYM3: Fuel Oil Boiler Option-Bldg. 504 - Fort Greely Utility Study
Ft. Greely Utility Study (Fuel Oil Boilers)

TIME 15:59:04

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FROMES STATES FROM STREET OF STATES OF THE STATES FOR STATES FROM STATES FOR STATES FOR STATES FROM ST	SUMMARY PAGE	PROJECT DIRECT SUMMARY - Scope	DETAIL PAGE	•
Frodect Gains: Fuel Of		Y - Scope		Site Civil/Mechanical Utilities 08. Building Fuel Distribution Syst
	SUMMARY REPORTS	PROJECT DIRECT SUMMAR	DETAILED ESTIMATE	19. Site Civil/Mechanical Utilities 08. Building Fuel Distribution S
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U.S. Army Corps of Engineers
PROJECT GRLYM3: Fuel Oil Boiler Option-Bldg. 504 - Fort Greely Utility Study
Ft. Greely Utility Study (Fuel Oil Boilers)
** PROJECT DIRECT SUMMARY - Scope **

SUMMARY PAGE

TIME 15:59:04

	QUANTITY UOM MATERIAL MANHRS	MATERIAL	MANHRS		JUI PMINT		UNIT COST
19 Site Civil/Mechanical Utilities	100 E	9,529	4	2,510	727	3,510 227 13,266	13.266 13265 57
					1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	- 1	
TOTAL Fuel Oil Boiler Option-Bldg. 504	1.00 EA	9,529	- 84	3,510	227	13,266	13265.57
Contractor's Overhead						1,990	
SUBTOTAL						15,255	
Contractor's Profit						1,526	
SUBTOTAL						16,781	
Contractor's Bond						503	
TOTAL INCL INDIRECTS						17,284	
Escalation						169	
SUBTOTAL						17,976	
Contingency						3,595	
TOTAL INCL OWNER COSTS						21,571	

Eff. Date 03/18/96 DETAILED ESTIMATE Mon 18 Mar 1996

Fuel Oil Boiler Option-Bldg. 504 - Fort Greely Utility Study Ft. Greely Utility Study (Fuel Oil Boilers) 19. Site Civil/Mechanical Utilities U.S. Army Corps of Engineers PROJECT GRLYM3:

TIME 15:59:04

DETAIL PAGE

1,370 61 LABOR EQUIPMNT TOTAL COST 430 610 54 28 88 259 628 44 53 61 17 4,063 48 0 0 0 0 0 29 362 29 55 14 14 216 110 0 0 0 0 0 73 194 318 19 1,638 MANHRS Ŋ 0 0 0 0 0 39 QUANTY UOM MATERIAL 15 54 39 1,005 14 15 214 65 53 44 61 2,416 4.00 EA 100.00 LF 0.50 MLF 1.00 EA EA EA 1.00 EA EA 100.00 LF ΕŻ EA E ΕA ΕA EA EA 30.00 CY 2.00 1.00 1.00 1.00 1.00 1.00 1.00 2.00 3.00 1.00 M MIL AA <15142 1101 > 10GPM CI Rotary Pump, 20PSI 1/2HP Y-Type, 250#(113kg) Screwed Ends UL Listed CIV AA <02225 1453 > Bulk Site Excavation, Heavy Clay for Thrd, Brazed or Soldered Inst 600V Cu, Sgl Strd, Pl in Cnd, 12'Hg 600V Cu, Sgl Strd, Pl in Cnd, 12' Hq <15111 1104 > 1/2" Swing Check Valve Brz 125# <16155 1241 > Auxiliary Contact,Normally Open
<16155 1242 > Auxiliary Cont,Normally Closed <16111 1401 > 1/2"Liquid-Tight Flex Assem, 3' M MIL AA <16111 3204 > RGS PVC Ctd 3/4"Conduit w/Cplg H-O-A Sel Sw, Factory Mod-NEMA Mag Mtr Starter, N-Rev, 208-600V Mag Str xfmr, Size 0, 1, Fcty Mod Comb Str, Sz 1, NEMA 1 w/Disc Sw Mag Mtr Starter, N-Rev, 208-600V Pilot Light, Factory Mod-NEMA 1 Conduit w/Straight Connectors M MIL AA <15061 1821 > 1/2" Union, 150# MI Black M MIL AA <15061 1601 > 1/2"(12mm) A-53 Pipe, Sch 40 Not Incl Hangers or Fittings Standard Control Transformer M MIL AA <15101 1103 > 1/2" Bronze 125# Gate Valve Threaded, Brazed or Soldered Direct Burial, 20 Mil Coated Non-Reversing, 240-600V, 3P <15083 1102 > 1/2" Strainer (Iron Body) TOTAL Fuel Distribution Piping B MIL AA <16120 1222 > #10 AWG Cable-XLP (xhhw) Level Switch, Hvy Dty, 4 CY Bucket Drag Line w/1" Discharge ٨ <16155 2151 > <16155 3112 M MIL AA <16155 2132 <16155 2133 M MIL AA M CIV AA B USR AA M MIL AA **8** 8 M MIL AA M MIL AA M MIL AA MIL MIL 19.08. Building Fuel Distribution Syst 19.08.01. Fuel Distribution Piping 19.08.02. Fuel Storage Tanks 19. Site Civil/Mechanical Utilities 19.08. Building Fuel Distribution Syst

Abv Gnd w/Supp, Coating&Fittings

M MIL AA <15176 1005 > 50 Gal Day Tank

UPB ID: CREW ID: FRBK94

3,622

26

352

3,244

1.00 EA

Coated, In Place w/Hold Down Bars

>= (15 cm) Place 3000 PSI Conc

184

2.00 CY

M MIL AA <03311 1166 > Pour Slab on Gr, >= 6", Conc Pump

M MIL AA <15176 4006 > 1000Gal Ugnd Dbl Wall Stl Tank

MIL AA <02222 4104 > Foundation Backfill, w/Loader

15

34 570 2,373

13 9 16

21 100 1,005

0

25.00 CY

410 1,292

1.00 EA 1.00 EA

> Containment Basin/Tank Sump 6" Lift without Compaction 6" Lift without Compaction

USR AA

203

Currency in DO

LABOR ID: FRBK94

PUIP ID: ALASKA

1996	03/18/96	ESTIMATE
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U.S. Army Corps of Engineers
PROJECT GRLYM3: Fuel Oil Boiler Option-Bldg. 504 - Fort Greely Utility Study
Ft. Greely Utility Study (Fuel Oil Boilers)
19. Site Civil/Mechanical Utilities

TIME 15:59:04

~ DETAIL PAGE

19.08. Building Fuel Distribution Syst.	OHANTY HOM MATERIAL MANNES LABOR FOUTDMANT TOTAL COST	ATERIAL.	MANHDS	TABOO INTERNATION TOWN	DANNET TO	14. COST
M MIL AA <15176 6011 > Sgl Chnl Ugnd Tk Monitoring Sys	1.00 EA	1,983	œ	8 359	6	2,351
TOTAL Fuel Storage Tanks	;	7,113	45	7,113 45 1,872 218	218	9,202
TOTAL Building Fuel Distribution Syst	i	9,529	84	9,529 84 3,510 227 13,266	227	13,266
TOTAL Site Civil/Mechanical Utilities	;	9,529	84	84 3,510 227 13,26	227	13,266
TOTAL Fuel Oil Boiler Option-Bldg. 504	;	9,529	84	9,529 84 3,510 227 13,266	227	13,266

LABOR ID: FRBK94

CREW ID: FRBK94 UPB ID: ANCH94

Water Wells to Cisterns

Mon 18 Mar 1996 Eff. Date 03/18/96

U.S. Army Corps of Engineers
2: Domestic Water Option - Fort Greely Utility Study
Ft. Greely Utility Study (Water Wells) PROJECT GRLYM2:

TIME 16:05:52

TITLE PAGE

Domestic Water Option
Fort Greely Utility Study
Installation of Domestic Water
Well and Fire Protection System

DGM

Designed By: Estimated By:

TCPPrepared By:

03/18/96 03/18/96 Preparation Date: Effective Date of Pricing: \$00.0 Sales Tax: This report is not copyrighted, but the information contained herein is For Official Use Only.

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LABOR ID: FRBK94

EQUIP ID: ALASKA

CREW ID: FRBK94

UPB ID: ANCH94

U.S. Army Corps of Engineers Domestic Water Option - Fort Greely Utility Study PROJECT GRLYM2:

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U.S. Army Corps of Engineers : Domestic Water Option - Fort Greely Uti Ft. Greely Utility Study (Water Wells)	SUMMARY PAGE	1	DETAIL PAGE	1
Mon 18 Mar 1996 Eff. Date 03/18/96 TABLE OF CONTENTS Ft. Greely Utility Study (Water Wells)	SUMMARY REPORTS	PROJECT DIRECT SUMMARY - Scope	DETAILED ESTIMATE	19. Site Civil/Mechanical Utilities 01. Water Supply & Distribution
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LABOR ID: FRBK94

U.S. Army Corps of Engineers
2: Domestic Water Option - Fort Greely Utility Study
Ft. Greely Utility Study (Water Wells)
** PROJECT DIRECT SUMMARY - Scope ** PROJECT GRLYM2:

Mon 18 Mar 1996 Eff. Date 03/18/96

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TIME 16:05:52

	QUANTITY UOM MATERIAL	MATERIAL	MANHRS	LABOR	EQUI PMNT	LABOR EQUIPMNT TOTAL COST UNIT COST
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		,		; ; ; ;	• • • • • • • • •	1
19 Site Civil/Mechanical Utilities	1.00 EA	1.00 EA 541,150 2,016 81,348 16,991	2,016	81,348	16,991	639,489 639488.55
TOTAL Domestic Water Option	1.00 EA	541,150	2,016	81,348	16,991	639,489 639488.55
Contractor's Overhead						95,923
SITEMOTESI						735,412
Contractor's Profit						73,541
SUBTOTAL						808,953
Contractor's Bond						24,269
TOTAL INCL INDIRECTS						833,222
Escalation						33,329
SUBTOTAL						866,550
Contingency						173,310
						1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
TOTAL INCL OWNER COSTS						1,039,861

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Mon 18 Mar 1996 Eff. Date 03/18/96 DETAILED ESTIMATE

U.S. Army Corps of Engineers
PROJECT GRLYM2: Domestic Water Option - Fort Greely Utility Study
Ft. Greely Utility Study (Water Wells)
19. Site Civil/Mechanical Utilities

TIME 16:05:52

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19.01. Wa	19.01. Water Supply & Distribution		QUANTY UOM MATERIAL	ATERIAL	MANHRS	LABOR E	LABOR BOUIPMNT TV	TOTAL COST
19. 8	19. Site Civil/Mechanical Utilities							
1	19.01. Water Supply & Distribution Systems							
	19.01.01. Well Systems	M MIL AA <02580 1001 > 4"(10cm) to 6"(15cm) Water Well Drilled and Cased, Incl Casing M MIL AA <15146 3001 > 15-135 GPH Submersible Pump 6" Disch for Wells, 200-500'Deep To 500 Ft (152M) Deep, 15 To 135 Gpm	2000.00 VLF 10.00 EA	25,600	485 280	17,929	11,838	55,367 29,425
		TOTAL Well Systems	1	41,680	765	29,699	13,414	84,792
	19.01.02. Potable Water Distribution	M MIL AA <15061 1606 > 2"(50mm) A-53 Pipe, Sch 40	4200.00 LF	7,728	442	18,397	172	26,297
F5-		M MIL AA <15101 1108 > 2º Bronze 125# Gate Valve	7.00 EA	191	9	284	m	478
4		M MIL AA <15061 1826 > 2" Union, 150# MI Black M MIL AA <15111 1109 > 2" Swing Check Valve Brz 125# for Thrd, Brazed or Soldered Inst	14.00 EA 7.00 EA	55 216	11 6	466 284	4 ເບ	525 503
		TOTAL Potable Water Distribution	ı	8,189	466	19,432	181	27,802
	19.01.03. Potable Water Storage	M MIL AA <15176 1004 > 100Gal Stl Stor TK,w/3/16"Shell	2.00 EA	2,251	40	1,636	18	3,905
		ADV GND W/SUPD, COALINGS-TECHNIGS MIL AA <15176 1005 > 200Gal Stl Stor Tk,w/3/16"Shell Ahv Gnd w/Supp Coaringstetiering	5.00 EA	6,459	123	5,026	378	11,863
		M MIL AA <15176 2004 > 800631 Stl Stor Tk,w/5/6"Shell UGnd, Incl Setting&Hold Down Bars	1.00 EA	5,789	43	1,759	132	7,680
		M MIL AA <15176 2005 > 1500Gal Stl Stor Tk,w/5/6"Shell Ugnd, Incl Setting&Hold Down Bars	2.00 EA	20,368	138	5,629	424	26,421
		TOTAL Potable Water Storage	ı	34,867	343	14,050	953	49,870
	19.01.04. Fire Protection Water Distrib.	MIL AA <02221 1103 > Trenching,1 CY Gradall, Hvy Soil	3000.00 CY	0	79	3,196	1,979	5,175
		MIL AA <02221 5003 > Backfill Trench w/Sm FEnd Loader	612.00 CY	0	13	525	317	842
		M MIL AA <15062 1003 > 4"(10cm) Cast Iron Pipe & Fitting 1100.00 LF	1100.00 LF	4,686	200	8,322	78	13,086
		TOTAL Fire Protection Water Distrib.	ı	4,686	292	12,043	2,374	19,103

CREW ID: FRBK94 UPB ID:

Currency in D

UPB ID:

Currency in DOLLARS

EQUIP ID: ALASKA LABOR ID: FRBK94

U.S. Army Corps of Engineers
PROJECT GRLYM2: Domestic Water Option - Fort Greely Utility Study
Ft. Greely Utility Study (Water Wells)
19. Site Civil/Mechanical Utilities

Mon 18 Mar 1996 Eff. Date 03/18/96 DETAILED ESTIMATE

TIME 16:05:52 DETAIL PAGE

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19.01. Water Supply & Distribution		QUANTY UOM MATERIAL MANHRS LABOR EQUIPMNT TOTAL COST	TERIAL	MANHRS	LABOR E	. LINWAIN	LABOR EQUIPMNT TOTAL COST
19.01.05. Fire Protection Water Storage	AA <15177 10	11.00 EA 4	51,728	150	6,125	69	457,922
	TOTAL Fire Protection Water Storage	; d '	451,728 150 6,125	150		69	69 457, 922
	TOTAL Water Supply & Distribution	1 10	541,150	2,016	2,016 81,348 16,991	16,991	541,150 2,016 81,348 16,991 639,489
	TOTAL Site Civil/Mechanical Utilities	; LO	541,150	2,016	541,150 2,016 81,348 16,991	16,991	639,489
	TOTAL Domestic Water Option	י וי	541,150	2,016	2,016 81,348 16,991	16,991	639,489

Septic Field

Mon 18 Mar 1996 Eff. Date 03/18/96

U.S. Army Corps of Engineers Septic Field Option - Fort Greely Utility Study Ft. Greely Utility Study (Septic) PROJECT GRLYM1:

TIME 16:13:55

TITLE PAGE

Septic Field Option Fort Greely Utility Study Installation of Septic Field

DGM Designed By: Estimated By:

TCP Prepared By: 03/18/96 03/18/96 Preparation Date: Effective Date of Pricing:

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Currency in DOLLARS

UPB ID: ANCH94

CREW ID: FRBK94

EQUIP ID: ALASKA

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LABOR ID: FRBK94

U.S. Army Corps of Engineers
PROJECT GRLYM1: Septic Field Option - Fort Greely Utility Study
Ft. Greely Utility Study (Septic)

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EQUIP ID: ALASKA

LABOR ID: FRBK94

1996	03/18/96
Mon 18 Mar	Date

	ly Utility Study		
ineers	Fort Gree	(Septic)	- Scope *
U.S. Army Corps of Engineers	PROJECT GRLYM1: Septic Field Option - Fort Greely Utility Study	Ft. Greely Utility Study (Septic)	** PROJECT DIRECT SUMMARY - Scope **
	PROJECT GRLYM1:	144	7

SUMMARY PAGE 1

TIME 16:13:55

1171100						CICO NAMED CAME
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						
111,213						Contingency
556,064						SUBTOTAL
21,387						Escalation
534,677						TOTAL INCL INDIRECTS
15,573						Contractor's Bond
519,104						SUBTOTAL
47,191						Contractor's Profit
471,913						SUBTOTAL
61,554						contractor's Overnead
	8,038 234,567 101,800	234,567		73,993	1.00 EA	TOTAL Septic Field Option
410,359 410358.93	8,038 234,567 101,800	234,567	8,038	1.00 EA 73,993 8,038 234,567 101,800	1.00 EA	19 Site Civil/Mechanical Utilities
LABOR EQUIPMNT TOTAL COST UNIT COST	EQUI PMNT		MANHRS	MATERIAL	QUANTITY UOM MATERIAL MANHRS	

Mon 18 Mar 1996 Eff. Date 03/18/96 DETAILED ESTIMATE

U.S. Army Corps of Engineers
PROJECT GRLYM1: Septic Field Option - Fort Greely Utility Study
Ft. Greely Utility Study (Septic)
19. Site Civil/Mechanical Utilities

TIME 16:13:55

DETAIL PAGE

19.02. Sanitary Sever Systems 19.02. Sanitary Sever Piping MILD AR 415862 1003 > 4" (10cm) Cast Iron Pipe & Fitting 1100.00 LP MILD AR 415862 1223) > 4" (1/4 Bend) Cast Iron Pipe & Fitting 1100.00 LP MILD AR 402221 103) > 7" (1/4 Bend) Cast Iron Pipe & Fitting 1100.00 LP MILD AR 402221 103) > 7" (1/4 Bend) Cast Iron Pipe & Fitting 1100.00 LP MILD AR 402221 103) > 7" (1/4 Bend) Cast Iron Pipe & Fitting 1100.00 LP MILD AR 402221 103) > 7" (1/4 Bend) Cast Iron Pipe & Fitting 1100.00 LP MILD AR 402221 103) > 7" (1/4 Bend) Cast Iron Pipe & Fitting 1100.00 LP MILD AR 402221 103) > 7" (1/4 Bend) Cast Iron Pipe & Fitting 1100.00 LP MILD AR 402221 103) > 7" (1/4 Bend) Cast Iron Pipe & Fitting 1100.00 LP MILD AR 402221 103) > 7" (1/4 Bend) Cast Iron Pipe & Fitting 1100.00 LP MILD AR 402221 103) > 7" (1/4 Bend) Cast Iron Pipe & Fitting 1100.00 LP MILD AR 402250 6002 > 1,000 dal Precast Septic Tank	19.02. Sar	19.02. Sanitary Sewer Systems		QUANTY UOM MATERIAL	TERIAL	MANHRS	LABOR E	LABOR EQUIPMNT 7	TOTAL COST
19.02.01. Samitary Sewer Piping M.MIL AA.15062 1023 > 4" (10cm) Cast Irron Pipe & Fitting 110.00 M.MIL AA.15062 1223 > 4" (10.4 Bend) Cast Irron Fitting 110.00 M.MIL AA.02221 1033 > Therching 1.0" Graduall, How Soil 2010.00 M.MIL AA.02221 1033 > Therching 1.0" Graduall, How Soil 2010.00 M.MIL AA.02221 5003 > Backfill Trench W/Sm FEMI Loader 2300.00 M.MIL AA.02221 5003 > Backfill Trench W/Sm FEMI Loader 2300.00 M.MIL AA.02221 5003 > Backfill Trench W/Sm FEMI Loader 2300.00 M.MIL AA.02221 5003 > Backfill Trench W/Sm FEMI Loader 2300.00 M.MIL AA.02221 5003 > Backfill Trench W/Sm FEMI Loader 2300.00 M.MIL AA.02250 6001 > 1,000 Gal Precast Septic Tank	19. Si	ite Civil/Mechanical Utilities			 	, 	; ; ; ; ; ; ;	1 1 1 1 1 1 1 1	1 1 1 1 1 1 1
19.02.01. Sanitary Sewer Piping M.MIL AA -15062 1023 > 4" (104m) Cast Iron Pipe & Fitting 110.00 M.MIL AA -15062 1223 > 4" (104m) Cast Iron Fitting 110.00 M.MIL AA -15062 1233 > 4" (104m) Cast Iron Fitting 110.00 M.MIL AA -15022 1103 > Trenching.1 CV Gradall, Hay Sid 120.00 M.MIL AA -15022 1103 > Trenching.1 CV Gradall, Hay Sid 120.00 M.MIL AA -15022 100 Salater Piping M.MIL AA -15020 5001 > 1,000 Gal Precast Septic Tank	15	9.02. Sanitary Sewer Systems							
MIL AA <02221 1103 Trench MAS Tank Trench MAS Tank Ta		19.02.01. Sanitary Sewer Piping	el5062 1003 s 4"(10cm)Caet Tron Dina & Bittina		202 1	ć	0	ç	
MIL AA 156221 1333 + " (1/8 Band) Cast Iron Fitting 110.00 MIL AA 60221 1030			<pre><15062 1223 > 4" (1/4 Bend) Cast Iron Fitting </pre>		2,181	71	2,943	27	5,152
19.02.05. Septic Tanks MIL AA <02221 50013 - Baackfill Treach Wish PEnd Loader 21300.00 Without Compaction TOTAL Sanitary Sewer Piping MIL AA <02560 60013 - 1,000 Gal Precast Septic Tank MIL AA <02560 60013 - 1,000 Gal Precast Septic Tank MIL AA <02560 6002 > 2,000 Gal Precast Septic Tank MIL AA <02560 6003 > 3,000 Gal Precast Septic Tank MIL AA <02560 6003 > 5,000 Gal Precast Septic Tank MIL AA <02560 6003 > 5,000 Gal Precast Septic Tank MIL AA <02560 6003 > 5,000 Gal Precast Septic Tank MIL AA <02560 6003 > 5,000 Gal Precast Septic Tank No Excavation or Piping MIL AA <02560 6003 > 5,000 Gal Precast Septic Tank No Excavation or Piping MIL AA <02560 6003 > 5,000 Gal Precast Septic Tank MIL AA <0251 6002 > 5,000 Gal Precast Septic Tank MIL AA <0221 1103 > Trenching 1 CY Gradall, Hvy Soil MIL AA <02221 1103 > Trenching 1 CY Gradall, Hvy Soil MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michout Compaction MIL AA <02221 1103 > Michou			<pre><15062 1233 > 4" (1/8 Bend) Cast Iron Fitting <02221 1103 > Trenching,1 CY Gradall, Hvy Soil 2</pre>		1,746 0	79	3,293	31	5,070
TOTAL Sanitary Sewer Piping 19.02.05. Septic Tank M MIL AA <02560 6001 > 1,000 Gal Precast Septic Tank M MIL AA <02560 6002 > 3,000 Gal Precast Septic Tank M MIL AA <02560 6002 > 3,000 Gal Precast Septic Tank M M M <02560 6003 > 4,000 Gal Precast Septic Tank M M M <02560 6003 > 4,000 Gal Precast Septic Tank M M M <02560 6003 > 4,000 Gal Precast Septic Tank M M M <02560 6003 > 5,000 Gal Precast Septic Tank M M M <02560 6003 > 5,000 Gal Precast Septic Tank M M M <02560 6003 > 5,000 Gal Precast Septic Tank M M <02560 6003 > 5,000 Gal Precast Septic Tank M M <02560 6003 > 5,000 Gal Precast Septic Tank M M <02560 6003 > 5,000 Gal Precast Septic Tank M M <02560 6003 > 5,000 Gal Precast Septic Tank M M <0251 6002 > 5,000 Gal Precast Septic Tank M M <0251 6002 > 5,000 Gal Precast Septic Tank M M <0251 6002 > 5,000 Gal Precast Septic Tank M M <0251 6002 > 5,000 Gal Precast Septic Tank M M <0251 6002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M <0251 5002 > 5,000 Gal Precast Septic Tank M M M <0251 5002 > 5,000 Gal Preca			75 CY/ Hr (58M3)/Hr,Cont Fig Exc <02221 5003 > Backfill Trench W/Sm FEnd Loader Without Compaction		0	4	1,972	1,192	3,164
19.02.05. Septic Tanks				,	8,613	460	18,981	2,845	30,439
M MIL AA <02560 6002 > 1,000 Gal Precast Septic Tank 2.00		19.02.05. Septic Tanks							
MIL AA <02560 6002			560 6001 > 1,000 Gal Precast Septic	2.00 EA	1,420	7	294	39	1,753
No Excavation or Piping]		No Excavation or Piping 560 6002 > 2,000 Gal Precast Septic		1,812	11	471	63	2,346
19.02.06. Drain Fields MIL AA <02560 6003 > 4,000 Gal Precast Septic Tank 2.00 MIL AA <02560 6003 > 4,000 Gal Precast Septic Tank 3.00 MIL AA <0250 6003 > 5,000 Gal Precast Septic Tank 2.00 NO Excavation or Piping TOTAL Septic Tanks TOTAL Septic Tanks MIL AA <02221 1103 > Trenching,1 CY Gradall, Hvy Soil 44489 75 CY Hr (SMB)/Hr, Cont Fig Exc MIL AA <02221 6002 > Sprd Dumped Fill/Grvl 12" Layers 39000 MIL AA <02221 6002 > Sprd Dumped Fill/Grvl 12" Layers 39000 MIL AA <02221 6001 > Sprd Dumped Fill/Grvl 12" Layers 39000 MIL AA <02221 6001 > Sprd Dumped Fill/Grvl 12" Layers 39000 MIL AA <0221 5001 > Plastic Filter Fabric 1000 MIL AA <0221 5001 > Plastic Filter Fabric 1000 MIL AA <0251 2001 > Plastic Filter Fabric 1000 MIL AA <0251 2001 > Plastic Filter Fabric 1000 MIL AA <0251 2001 > Plastic Filter Fabric 1000 MIL AA <0251 2001 > Plastic Filter Fabric 1000 MIL AA <0251 2001 > Plastic Filter Fabric 1000 MIL AA <0251 2001 > Plastic Filter Fabric 1000 MIL AA <0251 2001 > Plastic Filter Fabric 1000 MIL AA <0251 2001 > Plastic Filter Fabric 1000 MIL AA <0251 2001 > Plastic Filter Fabric 1000 MIL AA <02510 2010 > Outlet Conc Distribution Box 11.00 MIL AA <02510 2010 > Outlet Conc Distribution Box 11.00 MIL AA <02510 2010 > Outlet Conc Distribution Box 11.00 MIL AA <02510 2010 > Outlet Conc Distribution 10500 MIL AA <02510 2010 > Outlet Conc Distribution 10500 MIL AA <02510 2010 > Outlet Conc Distribution 10500 MIL AA <02510 2010 > Outlet Conc Distribution 10500 MIL AA <02510 2010 > Outlet Conc Distribution 10500 MIL AA <02510 2010 > Outlet Conc Distribution 10500 MIL AA <02510 2010 > Outlet Conc Distribution 10500 MIL AA <02510 2010 > Outlet Conc Distribution 10500 MIL AA <02510 2010 > Outlet Conc Distribution 10500 MIL AA <02510 2010 > Outlet Conc Distribution 10500 MIL AA <02510 2010 > Outlet Conc Distribution 10500 MIL AA <02510 2010 > Outlet Conc Distribution 10500 MIL AA <02510 2010 > Outlet Conc Distribution 10500 MIL AA <02510 2010 > Outlet Conc Distribution 10500 MIL AA <	F6-		No Excavation or Piping		. ;		į		
MIL AA <02560 6003 > 4,000 Gal Precast Septic Tank NO Excavation or Piping MIL AA <02560 6003 > 5,000 Gal Precast Septic Tank TOTAL Septic Tanks MIL AA <02221 1103 > Trenching, L CY Gradall, Hvy Soil 44489 75 CY/ Hr (58M3)/Hr,Cont Fig Exc MIL AA <02221 6002 > Sprd Dumped Fill/Grvl 12" Layers 39000 Without Compaction M USR AA <02221 8001 > Sand Bedding w/Sm FEnd Loader 40874 Without Compaction M MIL AA <0221 5003 > Backful Trench w/Sm FEnd Loader 40874 Without Compaction M MIL AA <02512 2001 > Plastic Filter Fabric Underground Drain Lines M MIL AA <02512 1001 > Plastic Filter Fabric M MIL AA <02512 2001 > Plastic Filter Fabric Underground Drain Lines M MIL AA <02512 2001 > Valiet Corc Distribution Box M MIL AA <02511 2101 > 4 "Dia Perf PVC Pipe, Underdrain 19500 M MIL AA <02511 2101 > Plastic Filter Fabric (10cm) Diameter	-4		560 6002 > 3,000 Gal Precast Septic No Excavation or Pining	2.00 EA	1,812	11	471	63	2,346
MIL AA <02560 6003 > 5,000 Gal Precast Septic Tank NO Excavation or Piping TOTAL Septic Tanks TOTAL Septic Tanks TOTAL Septic Tanks MIL AA <02221 1103 > Trenching,1 CY Gradall, Hvy Soil 44489 75 CY/ Hr (58M3)/Hr,Cont Fig Exc MIL AA <02221 6002 > Sprd Dumped Fill/Grvl 12" Layers 39000 Without Compaction M USR AA <02221 8001 > Sand Bedding w/Sm FEnd Loader 2167.00 MIL AA <02221 5003 > Backfill Trench w/Sm FEnd Loader 40874 Without Compaction M MIL AA <02512 2001 > Plastic Filter Fabric M MIL AA <02512 2001 > Plastic Filter Fabric Underground Drain Lines M MIL AA <02512 21 2101 > 4"Dia Perf PvC Pipe, Underdrain 19500 M MIL AA <02511 2101 > 4"Dia meter TOTAL Drain Fields			560 6003 > 4,000 Gal Precast Septic		10,115	49	2,072	277	12,465
MIL AA <02221 1103 > Trenching,1 CY Gradall, Hvy Soil 44489 75 CY/ Hr (58M3)/Hr,Cont Fig Exc MIL AA <02221 6002 > Sprd Dumped Fill/Grvl 12" Layers 39000 Without Compaction M USR AA <02221 8001 > Sand Bedding w/Sm FEnd Loader 2167.00 MIL AA <02221 5003 > Backfill Trench w/Sm FEnd Loader 40874 Without Compaction M MIL AA <02512 2001 > Plastic Filter Fabric Underground Drain Lines M MIL AA <02512 2001 > Variate Filter Fabric W MIL AA <02512 2001 > Variate Filter Fabric Underground Drain Lines M MIL AA <02512 2101 > 4"Dia Perf PvC Pipe, Underdrain 19500 (10cm) Diameter TOTAL Drain Fields			NO EXCAVALION OF PIPING 560 6003 > 5,000 Gal Precast Septic No Excavation or Piping	2.00 EA	6,744	33	1,381	185	8,310
MIL AA <02221 1103 > Trenching,1 CY Gradall, Hvy Soil 44489 75 CY/ Hr (58M3)/Hr,Cont Fig Exc MIL AA <02221 6002 > Sprd Dumped Fill/Grvl 12" Layers 39000 Without Compaction M USR AA <02221 8001 > Sand Bedding w/Sm FEnd Loader 2167.00 MIL AA <02221 5003 > Backfill Trench w/Sm FEnd Loader 40874 Without Compaction M MIL AA <02512 2001 > Plastic Filter Fabric Underground Drain Lines M MIL AA <02512 2001 > Variation Drain Lines M MIL AA <02512 2101 > 4"Dia Perf PvC Pipe, Underdrain 19500 (10cm) Diameter TOTAL Drain Fields				•	21,902	112	4,689	628	27,219
MIL AA <02221 1103 > Trenching,1 CY Gradall, Hvy Soil 44489 MIL AA <02221 6002 > Sprd Dumped Fill/Grvl 12" Layers 39000 Without Compaction M USR AA <02221 8001 > Sand Bedding w/Sm FEnd Loader 2167.00 MIL AA <02221 5003 > Backfill Trench w/Sm FEnd Loader 40874 M MIL AA <0221 2001 > Plastic Filter Fabric 390.00 M MIL AA <02512 2001 > Plastic Filter Fabric 390.00 M MIL AA <02501 2001 > Plastic Filter Fabric 390.00 M MIL AA <02501 2001 > Plastic Filter Fabric 390.00 M MIL AA <02501 2001 > Totalet Conc Distribution Box 390.00 M MIL AA <02501 2101 > 4"Dia Perf PVC Pipe, Underdrain 19500 (10cm) Diameter 19500									
75 CY/ Hr (58M3)/Hr,Cont Fig Exc 221 6002 > Sprd Dumped Fill/Grvl 12" Layers 39000 Without Compaction 221 8001 > Sand Bedding w/Sm FEnd Loader 2167.00 221 5003 > Backfill Trench w/Sm FEnd Loader 40874 Without Compaction 512 2001 > Plastic Filter Fabric Underground Drain Lines 560 6021 > 5 Outlet Conc Distribution Box 11.00 511 2101 > 4"Dia Perf PVC Pipe, Underdrain 19500 (10cm) Diameter TOTAL Drain Fields		19.02.06. Drain Fields	221 1103 >		0	1,175	47,399	29,345	76,744
Hithout Compaction 221 8001 > Sand Bedding w/Sm FEnd Loader 2167.00 221 5003 > Backfill Trench w/Sm FEnd Loader 40874 Siz 2001 > Plastic Filter Fabric Underground Drain Lines 560 6021 > 5 Outlet Conc Distribution Box 11.00 511 2101 > 4"Dia Perf PVC Pipe, Underdrain 19500 (10cm) Diameter TOTAL Drain Fields			221 6002 >		0	51	2,009	3,089	5,097
221 5003 > Backfill Trench w/Sm FEnd Loader 2157.00 221 5003 > Backfill Trench w/Sm FEnd Loader 40874 Without Compaction 390.00 512 2001 > Plastic Filter Fabric 390.00 Underground Drain Lines 560 6021 > 5 Outlet Conc Distribution Box 11.00 511 2101 > 4"Dia Perf PVC Pipe, Underdrain 19500 TOTAL Drain Fields			Without Compaction		0	6			
Without Compaction 512 2001 > Plastic Filter Fabric Underground Drain Lines 560 6021 > 5 Outlet Conc Distribution Box 11.00 511 2101 > 4"Dia Perf PVC Pipe, Underdrain 19500 (10cm) Diameter TOTAL Drain Fields			5001 > Sana Beauing W/Sm rEnd Loader 5003 > Backfill Trench W/Sm FEnd Loader		29,298	2,384 875	12,569 35,041	4,551	46,417
TOTAL Drain Fields TOTAL Drain Fields			Without Compaction			L			
560 6021 > 5 Outlet Conc Distribution Box 11.00 511 2101 > 4"Dia Perf PVC Pipe, Underdrain 19500 (10cm) Diameter TOTAL Drain Fields			ois 2001 > Fidablic Filler Fabric Underground Drain Lines		4,033	4 C	17,930	5,438	Z/,401
TOTAL Drain Fields			560 6021 > 511 2101 >		787	14 2,484	573 95,376	5 34,718	1,365
			TOTAL Drain Fields	,	43,477	7,467	210,896	98,327	352,701

Currency in D

CREW ID: FRBK94 UPB ID:

UIP ID: ALASKA

LABOR ID: FRBK9

1996	03/18/96	ESTIMATE
Mar	Date	Δ
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Mon	Eff.	DETA

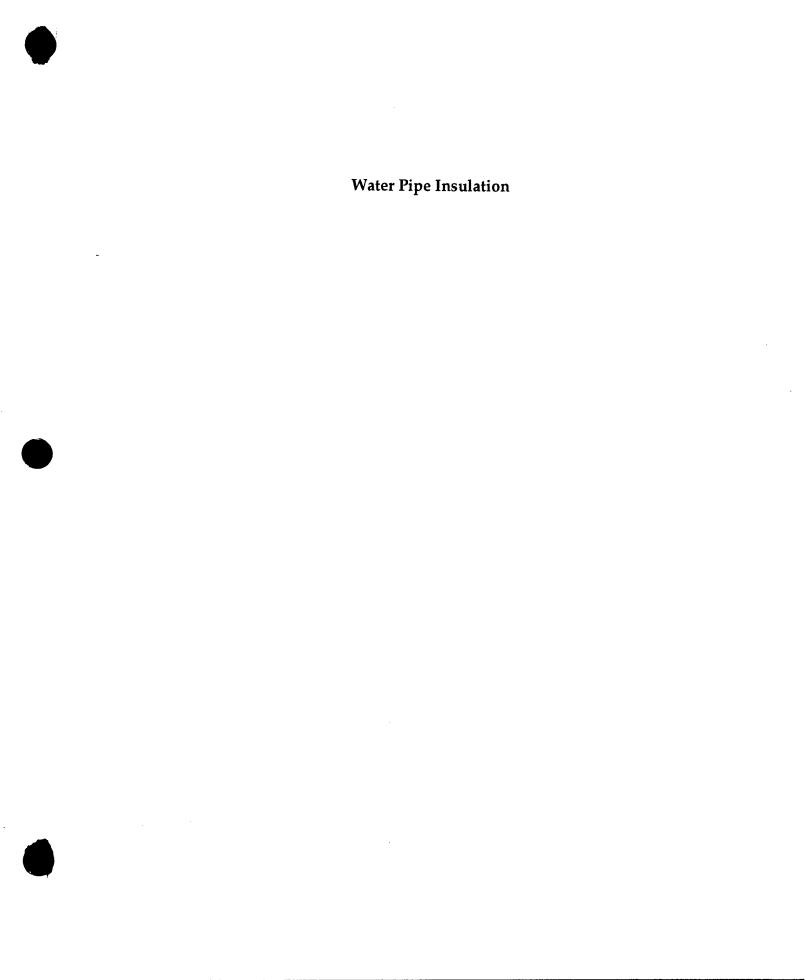
U.S. Army Corps of Engineers
PROJECT GRLYM1: Septic Field Option - Fort Greely Utility Study
Ft. Greely Utility Study (Septic)
19. Site Civil/Mechanical Utilities

TIME 16:13:55

0 DETAIL PAGE

OTAL COST	0	410,359	410,359	410,359
LABOR EQUIPMNT TOTAL COST	0	73,993 8,038 234,567 101,800 410,359	8,038 234,567 101,800 410,359	73,993 8,038 234,567 101,800 410,359
LABOR	0	234,567	234,567	234,567
MANHRS	0	8,038	8,038	8,038
QUANTY UOM MATERIAL MANHRS	0	73,993 8,038	73,993	73,993
19.02. Sanitary Sewer Systems LABOR EQUIPMNT TOTAL COST	19.02.9X. Other Sanitary Sewer TOTAL Other Sanitary Sewer	TOTAL Sanitary Sewer Systems	TOTAL Site Civil/Mechanical Utilities	TOTAL Septic Field Option

CREW ID: FRBK94 UPB ID: ANCH94



Mon 18 Mar 1996 Eff. Date 03/18/96

U.S. Army Corps of Engineers
PROJECT GRLYM6: Pipe Insulation Option - Fort Greely Utility Study
Ft. Greely Utility Study (Pipe Insulation)

TIME 17:21:18

TITLE PAGE

Pipe Insulation Option Fort Greely Utility Study Installation of Pipe Insulation Distribution System Domestic Water

DEJ Designed By: Estimated By:

TCP Prepared By: 03/18/96 03/18/96 Preparation Date: Effective Date of Pricing:

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EQUIP ID: ALASKA LABOR ID: FRBK94

Currency in DOLLARS

CREW ID: FRBK94 UPB ID: ANCH94

F7-1

TIME 17:21:18

U.S. Army Corps of Engineers
PROJECT GRLYM6: Pipe Insulation Option - Fort Greely Utility Study
Ft. Greely Utility Study (Pipe Insulation)

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DETAILED ESTIMATE	DETAIL PAGE
19. Site Civil/Mechanical Utilities 01. Water Supply & Distribution	1

No Backup Reports...

* * * END TABLE OF CONTENTS * * *

U.S. Army Corps of Engineers
PROJECT GRLYM6: Pipe Insulation Option - Fort Greely Utility Study
Ft. Greely Utility Study (Pipe Insulation)
** PROJECT DIRECT SUMMARY - Scope **

SUMMARY PAGE

TIME 17:21:18

QUANTITY UOM MATERIAL MANHRS LABOR EQUIPMNT TOTAL COST UNIT COST	QUANTITY UOM MATERIAL	MATERIAL	MANHRS	LABOR	EQUI PMINT	LABOR EQUIPMNT TOTAL COST UNIT COST	UNIT COST
19 Site Civil/Mechanical Utilities	1.00 EA	39,841	1,208	47,789	476	88,106	88105.95
TOTAL Pipe Insulation Option	1.00 EA	39,841	1,208	47,789	476	88,106	88105.95
Contractor's Overhead						13,216	
SUBTOTAL Contractor's Brofit						101,322	
כתונומככסו פ בוסוור						761,01	
SUBTOTAL						111,454	
Contractor's Bond						3,344	
TOTAL INCL INDIRECTS						114,798	
Escalation						4,592	
SUBTOTAL						119,390	
Contingency						23,878	
						1 1 1 1 1 1 1 1 1 1 1 1	
TOTAL INCL OWNER COSTS						143,267	

Mon 18 Mar 1996 Eff. Date 03/18/96 DETAILED ESTIMATE

Pipe Insulation Option - Fort Greely Utility Study Ft. Greely Utility Study (Pipe Insulation) 19. Site Civil/Mechanical Utilities U.S. Army Corps of Engineers PROJECT GRLYM6:

TIME 17:21:18

DETAIL PAGE

9,770 ,822 3,592 6,928 128 692 902 2,630 TOTAL COST 751 827 474 675 301 522 LABOR EQUIPMNT 15 54 12 28 15 23 5,426 1,163 1,480 2,855 486 417 459 333 167 1,461 352 501 412 MANHRS 137 11 12 12 13 10 37 QUANTY UOM MATERIAL 75 330 2,097 4,045 1,155 4,290 363 201 396 138 132 259 166 1,648 10.00 LF 片 Ľ 님 Ë ዟ Ľ 占 Ľ Ľ Cover for 6"D Pipe, 1-1/2"Tk 1300.00 LF 350.00 LF 120.00 LF 100.00 110.00 220.00 540.00 130.00 40.00 130.00 280.00 190.00 120.00 Cover for 8" D Pipe, 2" Thk Cover for 6"D Pipe, 1-1/2"Tk Cover for 6"D Pipe, 1-1/2"Tk Cover for 8" D Pipe, 2" Thk Cover for 8" D Pipe, 2" Thk Cover for 8" D Pipe, 2" Thk Cover for 1-1/4"D Pipe, 1"Tk Cover for 6"D Pipe, 1-1/2"Tk Cover for 1-1/4"D Pipe,1"Tk Cover for 6"D Pipe, 1-1/2"Tk Cover for 6"D Pipe, 1-1/2"Tk Cover for 4" D Pipe, 1" Thk Cover for 2-1/2"D Pipe,1"Tk Fire Retardant Jacket Fire Retardant Jacket Fire Retardant Jacket Fire Retardant Jacket Fire Retardant Jacket Fire Retardant Jacket Fire Retardant Jacket Fire Retardant Jacket Fire Retardant Jacket Fire Retardant Jacket Fire Retardant Jacket Fire Retardant Jacket Fire Retardant Jacket Fire Retardant Jacket With Fbgs With Fbgs With Fbgs With Fbgs With Fbgs With With Fbgs Fbgs With Fbgs Fbgs With With MIL AA <15182 1012 > Fbgs Fbgs With Fbgs With Fbgs With Fbgs With MIL AA <15182 1011 > ٨ ٨ MIL AA <15182 1011 > MIL AA <15182 1007 > MIL AA <15182 1011 M MIL AA <15182 1011 M MIL AA <15182 1012 MIL AA <15182 1011 MIL AA <15182 1009 MIL AA <15182 1012 MIL AA <15182 1012 M MIL AA <15182 1004 M MIL AA <15182 1011 M MIL AA <15182 1004 Σ Σ 19.01.02. Potable Water Distribution 19.01. Water Supply & Distribution 19. Site Civil/Mechanical Utilities 19.01. Water Supply & Distribution Systems

Currency in

Fire Retardant Jacket

YOUP ID: ALASKA

LABOR ID: FRB

CREW ID: FRBK94

UPB ID

1,804

878

9 10

579

15 25

190.00 LF

Fire Retardant Jacket Cover for 3" D Pipe, 1" Thk

1,002

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240.00

Cover for 6"D Pipe, 1-1/2"Tk

Fbgs

Fire Retardant Jacket

1,336

34

1,056 293 792

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320.00

4,810

27

2,671 793 170 417

67 20

2,112

640.00 LF

Cover for 6"D Pipe, 1-1/2"Tk

Fbds With

MIL AA <15182 1011 >

Cover for 6"D Pipe, 1-1/2"Tk

Fbgs With

M MIL AA <15182 1011 > M MIL AA <15182 1006 >

Fire Retardant Jacket Fire Retardant Jacket

627

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190.00

74

60.00 LF 100.00 LF

1,428

246 751 123 2,705 2,405

15 13

1,502

38

1,188

360.00 LF

Cover for 6"D Pipe, 1-1/2"Tk Cover for 6"D Pipe, 1-1/2"Tk

Fbgs With Fbgs With Fbgs With

M MIL AA <15182 1011 >

<15182 1011 >

M MIL AA M MIL AA M MIL AA

<15182 1008 > <15182 1011 >

Fire Retardant Jacket

82

37

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30.00

11

330

Cover for 6"D Pipe, 1-1/2"Tk

Cover for 2" D Pipe, 1" Thk

Fire Retardant Jacket

Fire Retardant Jacket

Cover for 2" D Pipe, 1" Thk

Fire Retardant Jacket

With Fbgs With Fbgs With

M MIL AA <15182 1011 > M MIL AA <15182 1006 >

Fbgs

U.S. Army Corps of Engineers
PROJECT GRLYM6: Pipe Insulation Option - Fort Greely Utility Study
Ft. Greely Utility Study (Pipe Insulation)
19. Site Civil/Mechanical Utilities

TIME 17:21:18

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DETAIL PAGE

19.01. Water Supply & Distribution		QUANTY UOM MATERIAL	(ATERIAL	MANHRS	LABOR EQUIPMNT	i	TOTAL COST
	M MIL AA <15182 1007 > Fbgs Cover for 2-1/2"D Pipe,1"Tk With Fire Retardant Jacket	TK 210.00 LF	290	16	617		913
	TOTAL Potable Water Distribution		22,093	624	24,737	246	47,076
	TOTAL Water Supply & Distribution		22,093	624	24,737	246	47,076
19.02. Site Preparation	M CIV AA <02113 4055 > PCM Air Sample Analysis for Asb Assume 20 air samples for pre-abatement, 20 for	b 60.00 EA	2,862	0	0	0	2,862
	abatement, and 20 for post-abatement. M CIV AA <02113 4061 > Personnel Equipment, Worker/Day	y 120.00 EA	4,446	0	0	0	4,446
	Coveralls, Respirator, Gloves B CIV AA <02113 4044 > Wrap-Up Area w/1 layer of poly 2 Layers of 6mm Sheeting. Assume 6000 LF x 10 LF width.	. 60000 SF	4,200	306	12,012	120	16,332
F7-5	Cost taken from Means Mechanical. USR AA < > Spray pipes w/surfactant-lockdwn Cost taken from Means Mechanical. Assume 1 steam and 1 condensate pipe (6000 LF	(wn 12000 LF	6,240	278	11,040	110	17,390
	TOTAL Site Preparation		17,748	584	23,052	230	41,030
	TOTAL Site Civil/Mechanical Utilities	8	39,841	1,208	47,789	476	88,106
	TOTAL Pipe Insulation Option		39,841	1,208	47,789	476	88,106

CREW ID: FRBK94 UPB ID: ANCH94

	200	22 20			MEY	LABOR-				1996 BAR	CE COSTS		TOTAL	Τ
07	20 800	Haz. Mat'l Abatement		CRE	W OUTPU	HOURS	UNIT	T MAI	ř. 1	LABOR	EQUIP.	TOTAL	INCL OUP	
1800	Vacuum	loader, 9-18 ton/hr	FI020				£1	80,0	00		•	80,000	88,000	81
1900	1	omizer unit, including 55 gal. drum	-820		1				00			200	220	
2000		protection, whole body, foot and head cover, gloves	_===	H-	+	_			10			10	11	1
2500	1	or, single use		Ш	}				10			10	11	ı
				Н—		1	H		3			3	3.30	1
2550		ridge for respirator			1 -							6		
2570		g, 7 mit, 50" x 64"		!!		<u> </u>	\vdash		6				6.60	_
2580		nii, 44° x 60°		l	1			1	6.25	- 1		6.25	6.90	1
3000		cuum for work area, minimun					Ш	1,0				1,000	1,100	1
3050	Max	imum		ll .				4,0	00	1		4,000	4,400	ı
6000	Disposa	nie polyethelene bags, 6 mil, 3 C.F.	1		1				.60	ı	•	.60	.66	
6300		ole fiber drums, 3 C.F.						1	5.75			5.75	6.35	7
6400	1	sensitive caution lables, 3" x 5"	l		1				.13	1		.13	.15	j
6450		x 17"		H-	+	-	1		.16			.16	.18	
1~~	1	A 17	,	7	1		 ▼	1						ı
10010	ACDECTOC	ABATEMENT WORK AREA Containment and prepar	etion	╁	+	-	_	+						t
	1		auci.	1.,			٠,	1		1,2		12	22	
0100	1	ning, HEPA vacuum and wet wipe		Al			Ş.F.		105	.13		.13		
0200	4	arpeted area, 2 layers 6 mil poly on 3/4" plywood		1 '	1,000	.064			1.25	1.83	.07	3.15	4.43	1
0300	Separati	on barrier, 2" x 4" @ 16", 1/2" pływood ea. side, 8'	high	F-2	400	.040			1	1.01	.05	2.06	2.76	_
0310	12'	high	R020		320	.050	\Box		1.10	1.26	.06	2.42	3.28	1
0320	16'	high	-820		200	.080	1		1.25	2.02	.09	3.36	4.70	1
0400	.1	decontam. chamber, 2" x 4" @ 16", 3/4" pty ea. s	side	$H \rightarrow$	280	.057		- 	2.05	1.44	.07	3.56	4.63	1
0450	1	econtam. chamber, 2" x 4" studs @ 16", 3/4" ply ea		1 1	360	.044			2.60	1.12	.05	3.77	4.71	
			1 SIUE	┼ ┸	1 300	- Jun	1		2.00		.00	9.77	4.7.1	┨
0500	1	rfaces with polyethelene sheeting,			1		l		- 1	1				ı
0501		iding glue and tape		<u> </u>			L.,							4
0550	↓> Floo	rs, each layer, 6 mil	i	A-1	1 '	.008	S.F.	.	.07	.23	.01	.31	.46	
0551		4 केरो		11	9,000	.007			.05	.20	.01	.26	.40	
0560	Wal	s, each layer, 6 mil		\Box	6,000	.011	П		.07	.31	.01	.39	.59	1
0561	•	4 mil		ll 1	7,000	.009	l ↓		.05	.26	.01	.32	.50	ı
0570		heights above 12', add		╅╌	+		1	1		20%				1
0575		heights above 20', add	1		ļ			1		30%				ı
0580		fire retardant poly, add		-		 	S.F.	+ ,	00%					1
	II.	• •			1		*		10%	20%	I			1
0590		arge open areas, deduct		١.	1 000		<u> </u>					AEC	-	4
0600	L	penetrations with foam firestop to 36 Sq. In.	1	F-2		.080	[<u>[</u> a.	1	2.45	2.02	.09	4.56	6	ı
0610		Sq. In. to 72 Sq. In.		Ш	125	.128			5.95	3.23	.15	9.33	11.85	_
0615	72	Sq. In. to 144 Sq. In.			80	200		1	12	5.05	.23	17.28	21.50	•
0620	Seal wa	penetrations with foam firestop to 36 Sq. In.			180	.089			2.45	2.24	.10	. 4.79	6.40	1
0630		Sq. In. to 72 Sq. In.			100	.160			5.95	4.03	.18	10.16	13.20	1
0640	4	Sq. In. to 144 Sq. In.		<u> </u>	60	267		1	12	6.70	.31	19.01	24.50	
0800		ams with latex		, 1 C2	1	.035	LF.		.15	.88		1.03	1.57	
1000	Caulk St	allis with bitcy	•	71`°	" 200		l "'	'		~	1		1.0.	ı
0010	DEMOUTIO	I IN ACCIOCACO CONTANINATED ADEA		╀			 							1
0010	4	N IN ASBESTOS CONTAMINATED AREA		1		000		1		ا جم			1 50	- 6
0200		nctuding suspension system, plaster and lath		A-9		.030	S.F.	\	_	.87	.10	.97	1.53	
0210	1	shed plaster, leaving wire lath			585	.109			- 1	3.13	.38	3.51	5.50	
0220		pended acoustical tile			3,500	.018				.52	.06	.58	:.92	_
0230	Spli	ned tile grid system			3,000	.021				.61	.07	.68	1.07	
0240) Met	al pan grid system		1	1,500	.043				1.22	.15	1.37	2.14	_
0250		sum board		T	2,500	.026	1	T		.73	.09	.82	1.29	1
0260		ting fixtures up to 2' x 4'		11	72	.889	Ea.	1	- 1	25.50	3.05	28.55	45	١
0400		s, non load bearing		╅	+	 	一	_						1
	(A-9	690	.093	S.F.	-	- 1	2.65	.32	2.97	4.66	
0410	1	ter, lath, and studs		+			3.r.	'		1.32	.16	1.48	2.31	_
0450	1	sum board and studs		'	1,390	.046	l	I		1.32	.10	1.40		I
9000		C (supplied air) respirator equipment, add		1_			%						10%	4
4 0010	1	STOS REMOVAL		1		1	1	ĺ						T
mic	. 1	discountry to a land of the and reading to add the busy	dese	1	ı	1		1		i				ı
0020) includes	disposable tools and 4 suits and respirators/day/wor	KEI											_
			KEI	A-9	480	.133	S.F.	.		3.81	.46	4.27	6.70	1



SITE WORK [2]

020 300 310	800 Haz. Mat'l Abatement	CREW				F	Mie I	14000	EQUIP.	TOTAL	BICI.
300		LKEW !	CUTPUT	HOUR	SĮ U	MIT	MAT.	LABOR ·	BUUT.	IVIAL	
		A-9	520	.123	1	S.F.		3.52	.42	3.94	
3101	Boiler breeching or flue insulation					*				100%	
	For active boiler, add	A-9	720	.089	1	S.F.		2.54	.30	2.84	
400	Duct or AHU insulation Duct vibration isolation joints, up to 24 Sq. In. duct		56	1.14	3	Ea.		32.50	3.92	36.42	
500	Duct vibration isolation joints, up to 24 oq. at. ooct	1	48	1.33	3			38	4.57	42.57	
520	25 Sq. In. to 48 Sq. In. duct		40	1.60	0	1	1	46	5.50	51.50	
530	49 Sq. In. to 76 Sq. In. duct	+	900	.07		LF.		2.03	24	2.27	l
0600	Pipe insulation up to 4" diameter pipe	-	800	.08		1 [2.29	27	2.56	Ĺ
0610	4" to 8" diameter pipe	十	700	.09	1	11		2.62	.31	2.93	l
0620	10° to 12° diameter pipe	1	550	.11	6	1.1		3.33	.40	3.73	
0630	14" to 16" diameter pipe	+	650	.09		S.F.		2.82	.34	3.16	l
0650	Over 16" diameter pipe	.	100	.64		UF.	5.75	18.30	2.20	26.25	<u> </u>
0700	With glove bag up to 3" diameter pipe	+	320	20		Ea.		5.70	.69	6.39	
1000	Pipe fitting insulation up to 4" diameter pipe	. 1	304	21		TI		6	.72	6.72	1
1100	6" to 8" diameter pipe	+	192	33		+		9.55	1.14	10.69	Г
1110	10" to 12" diameter pipe		128	.50		11		14.30	1.71	16.01	1
1120	14" to 16" diameter pipe	- 		36		S.F.		10.40	1.25	11.65	
1130	Over 16" diameter pipe	11	176	1		Ea.	6	46	5.50	57.50	ł
1200	With glove bag, up to 8" diameter pipe	\vdash	40	1.6	_		- 0	.76	.09	.85	一
2000	Scrape foam fireproofing from flat surface	1	2,400			S.F.		1.53	.18	1.71	i
2100	Irregular surfaces	\sqcup	1,200		_			2.29	27	2.56	┢
3000	Remove cementitious material from flat surface		800	.00				4.58	.55	5.13	
3100	Irregular surface	$oldsymbol{oldsymbol{oldsymbol{eta}}}$	400		_	*		4.58	.55	5.13	_
6000	Remove contaminated soil from crawl space by hand	♦	400	1	- 1	C.F.		2.62	.97	3.59	
6100	With large production vacuum loader	A-12			91				.18	1.71	
7000	Radiator backing, not including radiator removal	A-9	1,20	0. 0	53	S.F.		1.53		1.7.1	1
9000	For type C (supplied air) respirator equipment, add	<u> </u>		┸	_	%	<u> </u>				╁
0010	WASTE PACKAGING, HANDLING, & DISPOSAL				- 1				.55	5.78	
0100	Collect and bag bulk material, 3 C.F. bags, by hand	A-9	400		60	Ea.	.65	4.58		3.50	
0200	Large production vacuum loader	A-12	880		73	.	.65	2.08	1 1	2.79	
1000	Double bag and decontaminate	A-9	960	۵	67		.65			4.71	
	Containerize bagged material in drums,per bag		800		80		2.15		1	1.14	
2000	Cart bags 50' to dumpster	2 Ast	e 400) . (40	*		1.14		1.14	1
3000				\top		C.Y.		1			ı
5000	1	l				•					╄
5020	Land to the state of the state	†	1			%					1
9000	For type C (Supplied all) respirator equipments	l	1					ļ			╀-
0010	DECONTAMINATION CONTAINMENT AREA DEMOLITION and clean-up	П							1		
0100	1 (4) And Anna (heideing)	1_					<u> </u>			.62	ォ╌
0200		A-9			011	S.F.	.27	L			
0250	, , , , , , , , , , , , , , , , , , , ,		4,0		016	<u>L</u>	.32				_
0300		\prod	2,0		032	L.F.	.52		l l	1	
1 -	The second of th		8,0	1_	008	S.F.	.20			1	
1000		1	8,0	00 .	800		1	2		1	
1100			40	0 .	160	Ea.	.60				_
1500	til to book	1	2,4	00 .	.027	S.F.		.7			
2000	1		4,8	1	.013		<u> </u>	3			_
2500		17	6,4		.010	1 4		2	.03	3	32
2600	1	'		-		1				<u> </u>	_
3000		A.	9 2.8	300	.023	S.F.		.6	55 .08	-	73
310					.015		1		44 .0:		19
350		1			.032	1 +		7 9	92 .11	1	
360	Plywood carpet protection		1 1	300	.013	1 1).)4 .i	38 .09		47
500	HEPA vacuum and shampoo carpeting	+,		000	.008				23 .03	3 4	26
900	Final cleaning of protected surfaces	'	* ",		.550	\					
		+	+	-		+-	+	1			T
0 001	10 ENCAPSULATION WITH SEALANTS 00 Ceilings and walls, minimum	١.	.9 21	,000	.003	S.F		22 .	0. 90	1	.32

TITLE PAGE

U.S. Army Corps of Engineers LYM7: Potable Water Heater - Fort Greely Utility Study Ft. Greely Utility Study (Hot Water Boller) PROJECT GRLYM7:

Fort Greely Utility Study Install Potable Water Heater for Freeze Protection Potable Water Heater

DEJ Designed By: Estimated By:

TCP Prepared By: 01/04/96 01/04/96 Preparation Date: Effective Date of Pricing:

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Currency in DOLLARS

CREW ID: FRBK94 UPB ID: ANCH94

EQUIP ID: ALASKA

LABOR ID: FRBK94

F8-1

TIME 09:17:33

U.S. Army Corps of Engineers PROJECT GRLYM7: Potable Water Heater - Fort Greely Utility Study Ft. Greely Utility Study (Hot Water Boiler)

> Fri 05 Jan 1996 Eff. Date 01/04/96 TABLE OF CONTENTS

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No Backup Reports...

* * END TABLE OF CONTENTS * *

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U.S. Army Corps of Engineers
PROJECT GRLYM7: Potable Water Heater - Fort Greely Utility Study
Ft. Greely Utility Study (Hot Water Boiler)
** PROJECT DIRECT SUMMARY - Scope **

Fri 05 Jan 1996 Eff. Date 01/04/96

SUMMARY PAGE

TIME 09:17:33

		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
2 Bldg. 606 - Central Steam Plant	1.00 EA	9,049	72	2,988	139	12,176	12,176 12176.28
TOTAL Potable Water Heater	1.00 EA	9,049	72	2,988	139	12,176	12,176 12176.28
Contractor's Overhead						1,826	
SUBTOTAL						14,003	
Contractor's Profit						1,400	
						12111111111	
SUBTOTAL						15,403	
Contractor's Bond						462	
TOTAL INCL INDIRECTS						15,865	
Escalation						635	
						1 1 1 1 1	
SUBTOTAL						16,500	
Contingency						3,300	
TOTAL INCL OWNER COSTS						19,800	

DETAIL PAGE

Potable Water Heater - Fort Greely Utility Study Ft. Greely Utility Study (Hot Water Boiler) U.S. Army Corps of Engineers PROJECT GRLYM7:

Fri 05 Jan 1996 Eff. Date 01/04/96 DETAILED ESTIMATE

2. Bldg. 606 - Central Steam Plant

LABOR EQUIPMNT TOTAL COST MANHRS QUANTY UOM MATERIAL

2. Bldg. 606 - Central Steam Plant

2.09. HVAC

This system includes all equipment, distrbution systems, controls, and energy supply systems required by the heating, ventilating, and air conditioning system. 2.09. HVAC

This subsystem includes steam, hot water, furnace, and heater systems. Fuel include coal, oil, gas and electric unless otherwise noted. 2.09.02. Heating Generating Systems

7,977 1.00 EA M MIL AA <15621 2003 > 400MBH CI Gas/oil Fired H20 Blr Assemblies include boilers, expansion tanks, chemical feeders, air separators, pumps, heat exchangers, boiler feed units, etc. This assembly would also include fittings and specialties and the flue stack. The unit of measure at the assembly level is each. 2.09.02.02. Hot Water Boilers

TOTAL Hot Water Boilers

9,778

1,675

7,977

9,778

126 126

1,675

41 41 9,778

126

1,675

41

7,977

TOTAL Heating Generating Systems

2.09.04. Distribution Systems
This includes systems that distribute heated and cooled air, ventilating and exhaust air, hot and chilled water, steam, and glycol heating. 2.09.04.03. Hot Water Distribution Systems
Assemblies include pipe and fitting, including supports, wall and floor sleeves, and pipe insulation. The unit of measure at the assembly level is

-	m	н	H F	- ۱	-1	7	0	0	0	0
134	350	81	135	, ,	123	51	16	16	43	24
m	60	2	m	N 1	٠,	1	0	0	1	н
361	147	161	12	7	81	23	10	7.	19	18
1.00 EA	80.00 LF	2.00 EA	6.00 EA	2.00 EA	3.00 EA	1.00 EA	1.00 EA	1 00 E	15.00 LF	1.00 EA
M MIL AA <15141 4033 > 40GPM Brz Chtrf Pump w/2" Disch	Booster Pump w/20' Head & 1/3 HP M MIL AA <15061 1606 > 2"(50mm) A-53 Pipe, Sch 40	Not Incl Hangers or Fittings M MIL AA <15101 1302 > 2" Iron Body Gate Valve, Thrd	125# Bronze Mtd w/Threaded Valve M MIL AA <15061 1636 > 2" 90 Degree ELL,150# MI Black	MIL AA <15061 1696 > 2" Tee, Red Out 150# MI Black	> 8"x 5' Round Flue/Vent Pipe	Galv Dbl Wall Breech/Smoke Pipe M wrr. aa <15855 1184 > 8" Round Flue/Vent Pipe Tees	Galv Dbl Wall Breech/Smoke Pipe	Galv Dbl Wall Breech, Smoke Pipe	M MIL AA <15855 1194 > 8" Round File/vent Lop Caps Galv Dbl Wall Breech/Smoke Pipe M WTT. AA <15067 1004 > 1"(25mm) Cu Pipe/Tubing Type L	M MIL AA <15104 1103 > 1" Threaded Ball Valve, CS Trim Recular Port, Flue Drain
1033 >	× 9091	1302 :	1636	: 9691	1134	1184		* 171	1194	1103
<15141 4	<15061 1	<15101]	<15061	<15061	M MIL AA <15855 1134	. 15855		<t2822< td=""><td><15855</td><td><15104</td></t2822<>	<15855	<15104
Ą	Æ	Ą	¥	AA	¥	4	:	₹	A A	*
M MIL	M MIL	M MIL	M	MMIL	M MIL	M		Σ	M MIL	W WIT

FOULD ID: ALASKA

LABOR ID: FRBK94

Currency in DOL

UPB ID: ANCH94 CREW ID: FRBK94

42

32 63

148 74 205

497 501 243 74 26

2.09. HVAC

Fri 05 Jan 1996 Eff. Date 01/04/96 DETAILED ESTIMATE

U.S. Army Corps of Engineers
UYM7: Potable Water Heater - Fort Greely Utility Study
Pt. Greely Utility Study (Hot Water Boiler)
2. Bldg. 606 - Central Steam Plant PROJECT GRLYM7:

DETAIL PAGE 2 TIME 09:17:33

	QUANTY UOM MATERIAL	ATERIAL	MANHRS	LABOR	EQUIPMNT	LABOR EQUIPMNT TOTAL COST
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1		1 1 1 1 1 1 1	! ! ! ! !	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
M MIL AA <15063 1044 > 1" 90 Degree Elbow, Copper	3.00 EA	8	1	36	0	39
Flue Drain	T. 00 1.	33	H	57		91
M MIL AA <15063 1006 > 1-1/2"(40mm) Cu Pipe/Tubing 1P L M MIT AA <15185 1005 > 1-1/2"D Pipe,1"Thk Fib Pipe Cvr	15.00 LF	17		41	0	65
M MII. AA <15122 1105 > 1-1/2" x 1-1/2" Brz PRV, Thrd	1.00 EA	130	1	36	0	166
Boiler Relief Valves M MTI. AA <15061 1635 > 1-1/2" 90 Deg Ell, 150# MI Black	1.00 EA	1	0	18	0	19
M MTI. AA <15092 1201 > 2.07" ID Steel Pipe Sleeve	1.00 EA	25	н	40	н	99
	10.00 LF	6	1	24	0	33
Boiler Drain MIL AA <15063 1043 > 3/4" 90 Degree Elbow, Copper	2.00 EA	1	0	19	0	20
TOTAL Hot Water Distribution Systems	•	1,072	31	1,312	13	2,398
TOTAL Distribution Systems	•	1,072	31	1,312	13	2,398
TOTAL HVAC		9,049	72	2,988	139	12,176
TOTAL Bldg. 606 - Central Steam Plant		9,049	72	2,988	139	12,176
TOTAL Potable Water Heater		9,049	72	2,988	139	12,176

Currency in DOLLARS